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FIRST
LESSONS IN BOTANY
AND
VEGETABLE PHYSIOLOGY,

ILLUSTRATED BY OVER 360 WOOD ENGRAVINGS, FROM ORIGINAL
DRAWINGS, BY ISAAC SPRAGUE.

TO WHICH IS ADDED A COPIOUS

GLOSSARY,
OR
DICTIONARY OF BOTANICAL TERMS.

By ASA GRAY,

FISHER PROFESSOR OF NATURAL HISTORY IN HARVARD UNIVERSITY.

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PREFACE.

THIS book is intended for the use of beginners, and for classes in the common and higher schools, — in which the elements of Botany, one of the most generally interesting of the Natural Sciences, surely ought to be taught, and to be taught correctly, as far as the instruction proceeds. While these Lessons are made as plain and simple as they well can be, all the subjects treated of have been carried far enough to make the book a genuine Grammar of Botany and Vegetable Physiology, and a sufficient introduction to those works in which the plants of a country — especially of our own — are described.

Accordingly, as respects the principles of Botany (including Vegetable Physiology), this work is complete in itself, as a school-book for younger classes, and even for the students of our higher seminaries. For it comprises a pretty full account of the structure, organs, growth, and reproduction of plants, and of their important uses in the scheme of creation, — subjects which certainly ought to be as generally understood by all educated people as the elements of Natural Philosophy or Astronomy are; and which are quite as easy to be learned.

The book is also intended to serve as an introduction to the author's *Manual of the Botany of the Northern United States* (or to any similar work describing the plants of other districts), and to be to it what a grammar and a dictionary are to a classical author. It consequently contains many terms and details which there is no necessity for young students perfectly to understand in the first instance, and still less to commit to memory, but which they will need to refer to as occasions arise, when they come to analyze flowers, and ascertain the names of our wild plants.

To make the book complete in this respect, a full *Glossary, or Dictionary of Terms used in describing Plants*, is added to the volume. This contains very many words which are not used in the *Manual of Botany;* but as they occur in common botanical works, it was thought best to introduce and explain them. All the words in the Glossary which seemed to require it are accented.

It is by no means indispensable for students to go through the volume before commencing with the analysis of plants. When the proper season for botanizing arrives, and when the first twelve Lessons have been gone over, they may take up Lesson XXVIII. and the following ones, and proceed to study the various wild plants they find in blossom, in the manner illustrated in Lesson XXX., &c., — referring to the Glossary, and thence to the pages of the Lessons, as directed, for explanations of the various distinctions and terms they meet with. Their first essays will necessarily be rather tedious, if not difficult; but each successful attempt smooths the way for the next, and soon these technical terms and distinctions will become nearly as familiar as those of ordinary language.

Students who, having mastered this elementary work, wish to extend their acquaintance with Vegetable Anatomy and Physiology, and to consider higher questions about the structure and classification of plants, will be prepared to take up the author's *Botanical Text-Book*, or other more detailed treatises.

No care and expense have been spared upon the illustrations of this volume; which, with one or two exceptions, are all original. They were drawn from nature by Mr. Sprague, the most accurate of living botanical artists, and have been as freely introduced as the size to which it was needful to restrict the volume would warrant.

To append a set of questions to the foot of each page, although not unusual in school-books, seems like a reflection upon the competency or the faithfulness of teachers, who surely ought to have mastered the lesson before they undertake to teach it; nor ought facilities to be afforded for teaching, any more than learning, lessons by rote. A full *analysis of the contents* of the Lessons, however, is very convenient and advantageous. Such an Analysis is here given, in place of the ordinary table of contents. This will direct the teacher and the learner at once to the leading ideas and important points of each Lesson, and serve as a basis to ground proper questions on, if such should be needed.

ASA GRAY.

HARVARD UNIVERSITY, CAMBRIDGE,
January 1, 1857.

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IN

BOTANY AND VEGETABLE PHYSIOLOGY.

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BOTANY AS A BRANCH OF NATURAL HISTORY.

1. THE subjects of Natural History are, the earth itself and the beings that live upon it.

2. **The Inorganic World, or Mineral Kingdom.** The earth itself, with the air that surrounds it, and all things naturally belonging to them which are destitute of life, make up the mineral kingdom, or inorganic world. These are called *inorganic*, or unorganized, because they are not composed of *organs*, that is, of parts which answer to one another, and make up a whole, such as is a horse, a bird, or a plant. They were formed, but they did not grow, nor proceed from previous bodies like themselves, nor have they the power of producing other similar bodies, that is, of reproducing their kind. On the other hand, the various living things, or those which have possessed life, compose

3. **The Organic World,** — the world of organized beings. These consist of *organs;* of parts which go to make up an *individual*, a *being*. And each individual owes its existence to a preceding one like itself, that is, to a parent. It was not merely formed, but *produced*. At first small and imperfect, it grows and develops by powers of its own; it attains maturity, becomes old, and finally dies. It was formed of inorganic or mineral matter, that is, of earth and air, indeed; but only of this matter under the influence of life: and after life departs, sooner or later, it is decomposed into earth and air again.

4. The organic world consists of two kinds of beings; namely, 1. *Plants* or *Vegetables*, which make up what is called the *Vegetable Kingdom;* and, 2. *Animals*, which compose the *Animal Kingdom.*

5. **The Differences between Plants and Animals** seem at first sight so obvious and so great, that it would appear more natural to inquire how they resemble rather than how they differ from each other. What likeness does the cow bear to the grass it feeds upon? The one moves freely from place to place, in obedience to its own will, as its wants or convenience require: the other is fixed to the spot of earth where it grew, manifests no will, and makes no movements that are apparent to ordinary observation. The one takes its food into an internal cavity (the stomach), from which it is absorbed into the system: the other absorbs its food directly by its surface, by its roots, leaves, &c. Both possess organs; but the limbs or members of the animal do not at all resemble the roots, leaves, blossoms, &c. of the plant. All these distinctions, however, gradually disappear, as we come to the lower kinds of plants and the lower animals. Many animals (such as barnacles, coral-animals, and polyps) are fixed to some support as completely as the plant is to the soil; while many plants are not fixed, and some move from place to place by powers of their own. All animals move some of their parts freely; yet in the extent and rapidity of the motion many of them are surpassed by the common Sensitive Plant, by the Venus's Fly-trap, and by some other vegetables; while whole tribes of aquatic plants are so freely and briskly locomotive, that they have until lately been taken for animals. It is among these microscopic tribes that the animal and vegetable kingdoms most nearly approach each other, — so nearly, that it is still uncertain where to draw the line between them.

6. Since the difficulty of distinguishing between animals and plants occurs only, or mainly, in those forms which from their minuteness are beyond ordinary observation, we need not further concern ourselves with the question here. One, and probably the most absolute, difference, however, ought to be mentioned at the outset, because it enables us to see what plants are made for. It is this: —

7. Vegetables are nourished by the mineral kingdom, that is, by the ground and the air, which supply all they need, and which they are adapted to live upon; while animals are entirely nourished by vegetables. The great use of plants therefore is, to take portions of

earth and air, upon which animals cannot subsist at all, and to convert these into something upon which animals can subsist, that is, into food. *All food is produced by plants.* How this is done, it is the province of Vegetable Physiology to explain.

8. **Botany** is the name of the science of the vegetable kingdom in general.

9. **Physiology** is the study of the way a living being lives, and grows, and performs its various operations. The study of plants in this view is the province of *Vegetable Physiology.* The study of the form and structure of the organs or parts of the vegetable, by which its operations are performed, is the province of *Structural Botany.* The two together constitute *Physiological Botany.* With this department the study of Botany should begin; both because it lies at the foundation of all the rest, and because it gives that kind of knowledge of plants which it is desirable every one should possess; that is, some knowledge of the way in which plants live, grow, and fulfil the purposes of their existence. To this subject, accordingly, a large portion of the following Lessons is devoted.

10. The study of plants as to their *kinds* is the province of *Systematic Botany.* An enumeration of the kinds of vegetables, as far as known, classified according to their various degrees of resemblance or difference, constitutes a general *System of plants.* A similar account of the vegetables of any particular country or district is called a *Flora* of that country or district.

11. Other departments of Botany come to view when — instead of regarding plants as to what they are in themselves, or as to their relationship with each other — we consider them in their relations to other things. Their relation to the earth, for instance, as respects their distribution over its surface, gives rise to *Geographical Botany,* or *Botanical Geography.* The study of the vegetation of former times, in their fossil remains entombed in the crust of the earth, gives rise to *Fossil Botany.* The study of plants in respect to their uses to man is the province of *Agricultural Botany, Medical Botany,* and the like.

LESSON II.

THE GROWTH OF THE PLANT FROM THE SEED.

12. **The Course of Vegetation.** We see plants growing from the seed in spring-time, and gradually developing their parts: at length they blossom, bear fruit, and produce seeds like those from which they grew. Shall we commence the study of the plant with the full-grown herb or tree, adorned with flowers or laden with fruit? Or shall we commence with the seedling just rising from the ground? On the whole, we may get a clearer idea of the whole life and structure of plants if we begin at the beginning, that is, with the plantlet springing from the seed, and follow it throughout its course of growth. This also agrees best with the season in which the study of Botany is generally commenced, namely, in the spring of the year, when the growth of plants from the seed can hardly fail to attract attention. Indeed, it is this springing forth of vegetation from seeds and buds, after the rigors of our long winter, — clothing the earth's surface almost at once with a mantle of freshest verdure, — which gives to spring its greatest charm. Even the dullest beholder, the least observant of Nature at other seasons, can then hardly fail to ask: What are plants? How do they live and grow? What do they live upon? What is the object and use of vegetation in general, and of its particular and wonderfully various forms? These questions it is the object of the present Lessons to answer, as far as possible, in a simple way.

13. A reflecting as well as observing person, noticing the resemblances between one plant and another, might go on to inquire whether plants, with all their manifold diversities of form and appearance, are not all constructed on one and the same general plan. It will become apparent, as we proceed, that this is the case; — that one common plan may be discerned, which each particular plant, whether herb, shrub, or tree, has followed much more closely than would at first view be supposed. The differences, wide as they are, are merely incidental. What is true in a general way of any ordinary vegetable, will be found to be true of all, only with great variation in the details. In the same language, though in varied phrase, the hundred thousand kinds of plants repeat the same

story,—are the living witnesses and illustrations of one and the same plan of Creative Wisdom in the vegetable world. So that the study of any one plant, traced from the seed it springs from round to the seeds it produces, would illustrate the whole subject of vegetable life and growth. It matters little, therefore, what particular plant we begin with.

14. **The Germinating Plantlet.** Take for example a seedling Maple. Sugar Maples may be found in abundance in many places, starting from the seed (i. e. *germinating*) in early spring, and Red Maples at the beginning of summer, shortly after the fruits of the season have ripened and fallen to the ground. A pair of narrow green leaves raised on a tiny stem make up the whole plant at its first appearance (Fig. 4). Soon a root appears at the lower end of this stemlet; then a little bud at its upper end, between the pair of leaves, which soon grows into a second joint or stem bearing another pair of leaves, resembling the ordinary leaves of the Red Maple, which the first did not. Figures 5 and 6 represent these steps in the growth.

15. Was this plantlet formed in the seed at the time of germination, something as the chick is formed in the egg during the process of incubation? Or did it exist before in the seed, ready formed? To decide this question, we have only to inspect a sound seed, which in this instance requires no microscope, nor any other instrument than a sharp knife, by which the coats of the seed (previously soaked in water, if dry) may be laid open. We find within the seed, in this case, the little plantlet ready formed, and nothing else (Fig. 2);—namely, a pair of leaves like those of the earliest seedling (Fig. 4), only smaller, borne on a stemlet just like that of the seedling, only much shorter, and all snugly coiled up within the protecting seed-coat. The plant then exists beforehand in the seed, in miniature. It was not formed, but only devel-

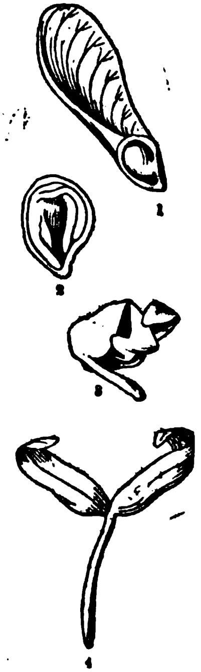
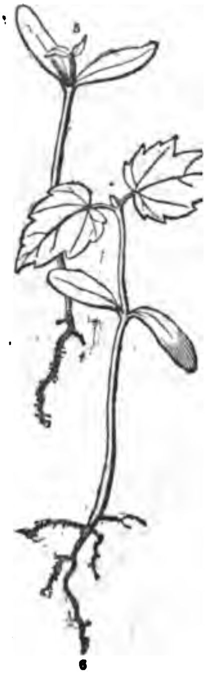


FIG. 1. A winged fruit of Red Maple, with the seed-bearing portion cut open, to show the seed. 2. This seed cut open to show the embryo plantlet within, enlarged. 3. The embryo taken out whole, and partly unfolded. 4. The same after it has begun to grow; of the natural size.

oped, in germination; when it had merely to unfold and grow,—to elongate its rudimentary stem, which takes at the same time an upright position, so as to bring the leaf-bearing end into the light and air, where the two leaves expand; while from the opposite end, now pushed farther downwards into the soil, the root begins to grow. All this is true in the main of all plants that spring from real seeds, although with great diversity in the particulars. At least, there is hardly an exception to the fact, that *the plantlet exists ready formed in the seed*, in some shape or other.

16. The rudimentary plantlet contained in the seed is called an *Embryo*. Its little stem is named the *Radicle*, because it was supposed to be the root, when the difference between the root and stem was not so well known as now. It were better to name it the *Caulicle* (i. e. little stem); but it is not expedient to change old names. The seed-leaves it bears on its summit (here two in number) are technically called *Cotylèdons*. The little bud of undeveloped leaves which is to be found between the cotyledons before germination in many cases (as in the Pea, Bean, Fig. 17, &c.), has been named the *Plumule*.



17. In the Maple (Fig. 4), as also in the Morning-Glory (Fig. 28), and the like, this bud, or plumule, is not seen for some days after the seed-leaves are expanded. But soon it appears, in the Maple as a pair of minute leaves (Fig. 5), erelong raised on a stalk which carries them up to some distance above the cotyledons. The plantlet (Fig. 6) now consists, above ground, of two pairs of leaves, viz.: 1. the cotyledons or seed-leaves, borne on the summit of the original stemlet (the radicle); and 2. a pair of ordinary leaves, raised on a second joint of stem which has grown from the top of the first. Later, a third pair of leaves is formed, and raised on a third joint of stem, proceeding from the summit of the second (Fig. 7), just as that did from the first; and so on, until the germinating plantlet becomes a tree.

FIG. 5. Germinating Red Maple, which has produced its root beneath, and is developing a second pair of leaves above. 6. Same, further advanced.

18. So the youngest seedling, and even the embryo in the seed, is already an epitome of the herb or tree. It has a stem, from the lower end of which it strikes root; and it has leaves. The tree itself in its whole vegetation has nothing more in kind. To become a tree, the plantlet has only to repeat itself upwardly by producing more similar parts, — that is, new portions of stem, with new and larger leaves, in succession, — while beneath, it pushes its root deeper and deeper into the soil.

19. **The Opposite Growth of Root and Stem** began at the beginning of germination, and it continues through the whole life of the plant. While yet buried in the soil, and perhaps in total darkness, as soon as it begins to grow, the stem end of the embryo points towards the light, — curving or turning quite round if it happens to lie in some other direction, — and stretches upwards into the free air and sunshine; while the root end as uniformly avoids the light, bends in the opposite direction to do so if necessary, and ever seeks to bury itself more and more in the earth's bosom. How the plantlet makes these movements, we cannot explain. But the object of this instinct is obvious. It places the plant from the first in the proper position, with its roots in the moist soil, from which they are to absorb nourishment, and its leaves in the light and air, where alone they can fulfil their office of digesting what the roots absorb.

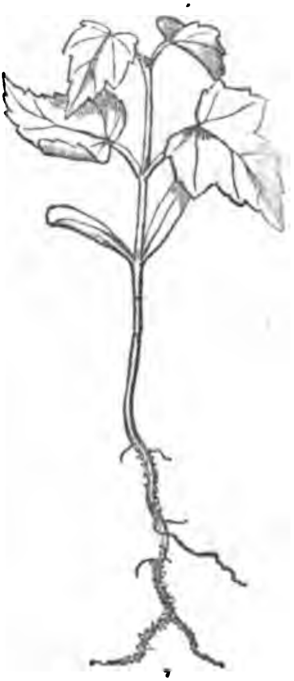


FIG. 7. Germinating Red Maple, further developed.

20. So the seedling plantlet finds itself provided with all the *organs of vegetation* that even the oldest plant possesses, — namely, root, stem, and leaves; and has these placed in the situation where each is to act, — the root in the soil, the foliage in the light and air. Thus established, the plantlet has only to set about its proper work.

21. **The different Mode of Growth of Root and Stem** may also be here mentioned. Each grows, not only in a different direction, but in a different way. The stem grows by producing a set of joints, each from

the summit of its predecessor; and each joint elongates throughout every part, until it reaches its full length. The root is not composed of joints, and it lengthens only at the end. The stem in the embryo (viz. the radicle) has a certain length to begin with. In the pumpkin-seed, for instance (Fig. 9), it is less than an eighth of an inch long: but it grows in a few days to the length of one or two inches (Fig. 10), or still more, if the seed were deeper covered by the soil. It is by this elongation that the seed-leaves are raised out of the soil, so as to expand in the light and air. The length they acquire varies with the depth of the covering. When large and strong seeds are too deeply buried, the stemlet sometimes grows to the length of several inches in the endeavor to bring the seed-leaves to the surface. The lengthening of the succeeding joints of the stem serves to separate the leaves, or pairs of leaves, from one another, and to expose them more fully to the light.

22. The root, on the other hand, begins by a new formation at the base of the embryo stem; and it continues to increase in length solely by additions to the extremity, the parts once formed scarcely elongating at all afterwards. This mode of growth is well adapted to the circumstances in which roots are placed, leaving every part undisturbed in the soil where it was formed, while the ever-advancing points readily insinuate themselves into the crevices or looser portions of the soil, or pass around the surface of solid obstacles.

LESSON III.

GROWTH OF THE PLANT FROM THE SEED.—*Continued.*

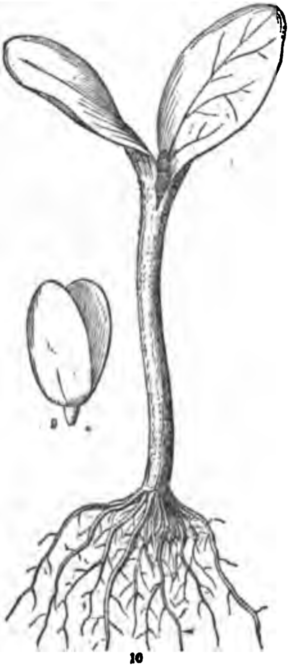
23. So a plant consists of two parts, growing in a different manner, as well as in opposite directions. One part, the root, grows downwards into the soil: it may, therefore, be called the *descending axis.* The other grows upwards into the light and air: it may be called the *ascending axis.* The root grows on continuously from the extremity, and so does not consist of joints, nor does it bear leaves, or anything of the kind. The stem grows by a succession of joints, each bearing one or more leaves on its summit. Root on the one hand, and stem with its foliage on the other, make up the whole plantlet as it springs from the seed; and the full-grown herb, shrub, or tree has nothing more in kind,—only more in size and number. Before we trace the plantlet into the herb or tree, some other cases of the growth of the plantlet from the seed should be studied, that we may observe how the same plan is worked out under a variety of forms, with certain differences in the details. The materials for this study are always at hand. We have only to notice what takes place all around us in spring, or to plant some common seeds in pots, keep them warm and moist, and watch their germination.

24. **The Germinating Plantlet feeds on Nourishment provided beforehand.** The embryo so snugly ensconced in the seed of the Maple (Fig. 2, 3, 4) has from the first a miniature stem, and a pair of leaves already green, or which become green as soon as brought to the light. It has only to form a root by which to fix itself to the ground, when it becomes a perfect though diminutive vegetable, capable of providing for itself. This root can be formed only out of proper material: neither water nor anything else which the plantlet is imbibing from the earth will answer the purpose. The proper material is nourishing matter, or prepared food, more or less of which is always provided by the parent plant, and stored up in the seed, either *in* the embryo itself, or *around* it. In the Maple, this nourishment is stored up in the thickish cotyledons, or seed-leaves. And there is barely enough of it to make the beginning of a root, and to provide for the lengthening of the stemlet so as to bring up the unfolding seed-leaves where they may expand to the light of day. But when this is done,

the tiny plant is already able to shift for itself; — that is, to live and continue its growth on what it now takes from the soil and from the air, and *elaborates into nourishment* in its two green leaves, under the influence of the light of the sun.

25. In most ordinary plants, a larger portion of nourishment is provided beforehand in the seed; and the plantlet consequently is not so early or so entirely left to its own resources. Let us examine a number of cases, selected from very common plants. Sometimes, as has just been stated, we find this

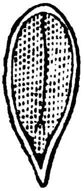
26. **Deposit of Food in the Embryo itself.** And we may observe it in every gradation as to quantity, from the Maple of our first illustration, where there is very little, up to the Pea and the Horsechestnut, where there is as much as there possibly can be. If we strip off the coats from the large and flat seed of a Squash or Pumpkin, we find nothing but the embryo within (Fig. 9); and almost the whole bulk of this consists of the two seed-leaves. That these contain a good supply of nourishing matter, is evident from their sweet taste and from their thickness, although there is not enough to obscure their leaf-like appearance. It is by feeding on this supply of nourishment that the germinating Squash or Pumpkin (Fig. 10) grows so rapidly and so vigorously from the seed, — lengthening its stemlet to more than twenty times the length it had in the seed, and thickening it in proportion, — sending out at once a number of roots from its lower end, and soon developing the plumule (16) from its upper end into a third leaf: meanwhile the two cotyledons, relieved from the nourishment with which their tissue was gorged, have expanded into useful green leaves.



27. For a stronger instance, take next the seed of a Plum or Peach, or an Almond, or an Apple-seed (Fig. 11, 12), which shows

FIG. 9. Embryo of a Pumpkin, of the natural size; the cotyledons a little opened. 10. The same, when it has germinated.

the same thing on a smaller scale. The embryo, which here also makes up the whole bulk of the kernel of the seed, differs from that of the Pumpkin only in having the seed-leaves more thickened, by the much larger quantity of nourishment stored up in their tissue, — so large and so pure indeed, that the almond becomes an article of food. Fed by this abundant supply, the second, and even the third joints of the stem, with their leaves, shoot forth as soon as the stemlet comes to the surface of the soil. The Beech-nut (Fig. 13), with its sweet and eatable kernel, consisting mainly of a pair of seed-leaves folded together, and gorged with nourishing matter, offers another instance of the same sort: this ample store to feed upon enables the germinating plantlet to grow with remarkable vigor, and to develop a second joint of stem, with its pair of leaves (Fig. 14), before the first pair has expanded or the root has obtained much foothold in the soil.



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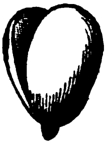

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28. A Bean affords a similar and more familiar illustration. Here the cotyledons in the seed (Fig. 16) are so thick, that, although they are raised out of ground in the ordinary way in germination (Fig. 17), and turn greenish, yet they never succeed in becoming leaf-like, — never display their real nature of leaves, as they do so plainly in the Maple (Fig. 5), the Pumpkin (Fig. 10), the Morning-Glory (Fig. 8, 26 – 28), &c. Turned to great account as magazines of food for the germinating plantlet, they fulfil this special office admirably, but

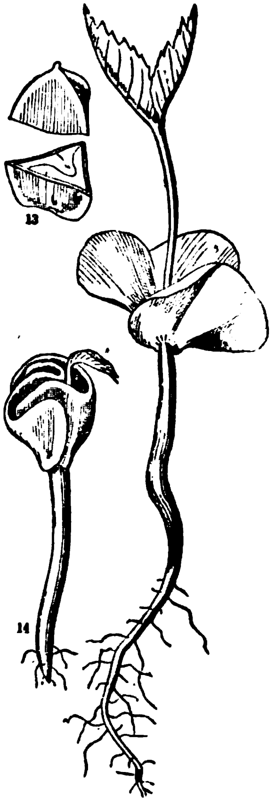
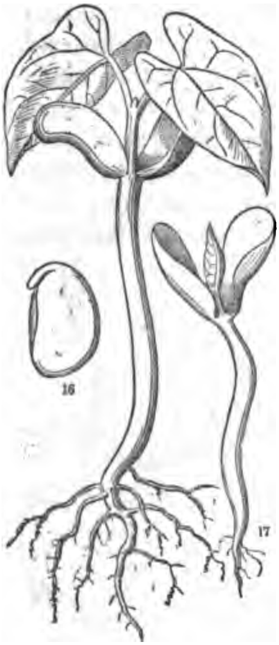


FIG. 11. An Apple-seed cut through lengthwise, showing the embryo with its thickened cotyledons. 12. The embryo of the Apple, taken out whole, its cotyledons partly separated.

FIG. 13. A Beech-nut, cut across. 14. Beginning germination of the Beech, showing the plumule growing before the cotyledons have opened or the root has scarcely formed. 15. The same, a little later, with the second joint lengthened.

they were so gorged and, as it were, misshapen, that they became quite unfitted to perform the office of foliage. This office is accordingly first performed by the succeeding pair of leaves, those of the plumule (Fig. 17, 18), which is put into rapid growth by the abundant nourishment contained in the large and thick seed-leaves. The latter, having fulfilled this office, soon wither and fall away.



29. This is carried a step farther in the Pea (Fig. 19, 20), a near relative of the Bean, and in the Oak (Fig. 21, 22), a near relative of the Beech. The difference in these and many other similar cases is this. The cotyledons, which make up nearly the whole bulk of the seed are excessively thickened, so as to become nearly hemispherical in shape. They have lost all likeness to leaves, and all power of ever fulfilling the office of leaves. Accordingly in germination they remain unchanged within the husk or coats of the seed, never growing themselves, but supplying abundant nourishment to the plumule (the bud for the forming stem) between them. This pushes forth from the seed, shoots upward, and gives rise

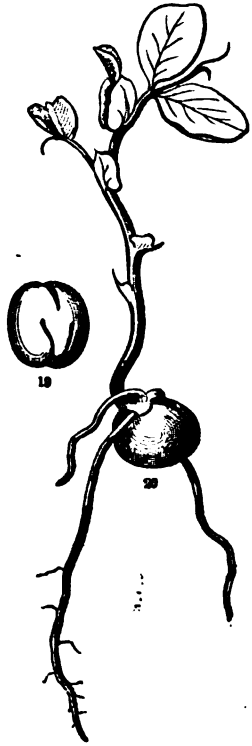


FIG. 16. A Bean: the embryo, from which seed-coats have been removed: the small stem is seen above, bent down upon the edge of the thick cotyledons. 17. The same in early germination; the plumule growing from between the two seed-leaves. 18. The germination more advanced, the two leaves of the plumule unfolded, and raised on a short joint of stem.

FIG. 19. A Pea: the embryo, with the seed-coats taken off. 20. A Pea in germination.

to the first leaves that appear. In most cases of the sort, the radicle, or short original stemlet of the embryo below the cotyledons (which is plainly shown in the Pea, Fig. 19), lengthens very little, or not at all; and so the cotyledons remain under ground, if the seed was covered by the soil, as every one knows to be the case with Peas. In these (Fig. 20), as also in the Oak (Fig. 22), the leaves of the first one or two joints are imperfect, and mere small scales; but genuine leaves immediately follow. The Horsechestnut and Buckeye (Fig. 23, 24) furnish another instance of the same sort. These trees are nearly related to the Maple; but while the seed-leaves of the Maple show themselves to be leaves, even in the seed (as we have already seen), and when they germinate fulfil the office of ordinary leaves, those of the Buckeye and of the Horsechestnut (Fig. 23), would never be suspected to be the same organs. Yet they are so, only in another shape, — exceedingly thickened by the accumulation of a great quantity of starch and other nourishing matter in their substance; and besides, their contiguous faces stick together more or less firmly, so that they never open. But the stalks of these seed-leaves grow, and, as they lengthen, push the radicle and the plumule out of the seed, when the one grows downward to make the root, the other upward to form the leafy stem (Fig. 24).

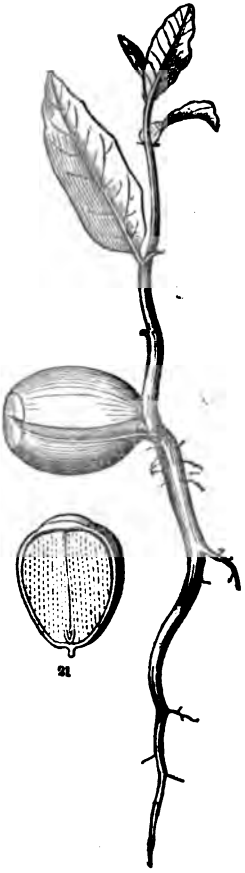
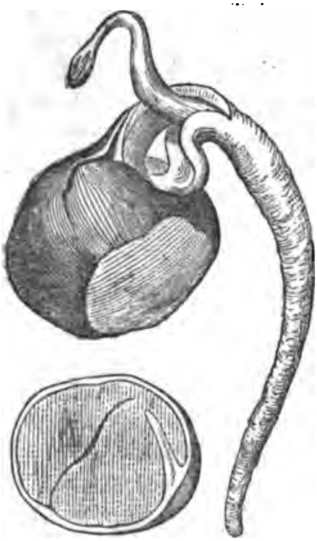
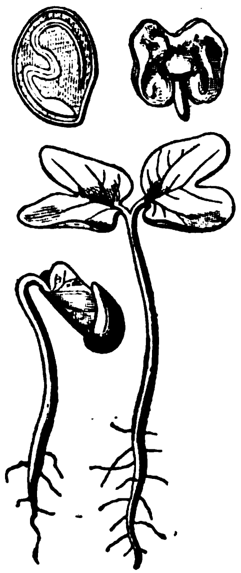


FIG. 21. An acorn divided lengthwise. 22. The germinating Oak.

30. **Deposit of Food outside of the Embryo.** Very often the nourishment provided for the seedling plantlet is laid up, not *in* the embryo itself, but *around* it. A good instance to begin with is furnished by the common Morning-Glory, or Convolvulus. The embryo, taken out of the seed and straightened, is shown in Fig. 26. It consists of a short stemlet and of a pair of very thin and delicate green leaves, having no stock of nourishment in them for sustaining the

earliest growth. On cutting open the seed, however, we find this embryo (considerably crumpled or folded together, so as to occupy less space, Fig. 25) to be surrounded by a mass of rich, mucilaginous matter (becoming rather hard and solid when dry), which forms the principal bulk of the seed. Upon this stock the embryo feeds in germination; the seed-leaves absorbing it into their tissue as it is rendered soluble (through certain chemical changes) and dissolved by the water which the germinating seed imbibes from the moist soil. Having by this aid lengthened its radicle into a stem of considerable length, and formed the beginning of a root at its lower end, already imbedded in the soil (Fig. 27), the cotyledons now disengage themselves from the seed-coats, and expand in the light as the first pair of leaves (Fig. 28). These immediately begin to elaborate, under the sun's influence, what the root imbibes from the soil, and the new nourishment so produced is used, partly to increase the size of the little stem, root, and leaves already existing, and partly to produce a second joint of stem with its leaf (Fig. 29), then a third with its leaf (Fig. 8); and so on.



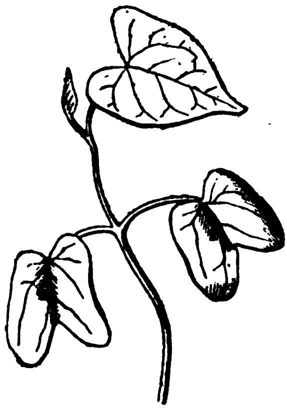


31. This maternal store of food, deposited in the seed along with the embryo (but not in its substance), the old botanists likened to

FIG. 23. Buckeye: a seed divided. 24. A similar seed in gemination.

FIG. 25. Seed and embryo of Morning-Glory, cut across. 26. Embryo of the same, detached and straightened. 27. Germinating Morning-Glory. 28. The same further advanced; its two thin seed-leaves expanded.

the *albumen*, or white of the egg, which encloses the yolk, and therefore gave it the same name,— the *albumen* of the seed,— a name which it still retains. Food of this sort for the plant is also food for animals, or for man; and it is this albumen, the floury part of the seed, which forms the principal bulk of such important grains as those of Indian Corn (Fig. 38 – 40), Wheat, Rice, Buckwheat, and of the seed of Four-o'clock, (Fig. 36, 37), and the like. In all these last-named cases, it may be observed that the embryo is not enclosed in the albumen, but placed on one side of it, yet in close contact with it, so that the embryo may absorb readily from it the nourishment it requires when it begins to grow. Sometimes the embryo is coiled around the outside, in the form of a ring, as in the Purslane and the Four-o'clock (Fig. 36, 37); sometimes it is coiled within the albumen, as in the Potato (Fig. 34, 35); sometimes it is straight in the centre of the albumen, occupying nearly its whole length, as in the Barberry (Fig. 32, 33), or much smaller and near one end, as in the Iris (Fig. 43); or sometimes so minute, in the midst of the albumen, that it needs a magnifying-glass to find it, as in the But-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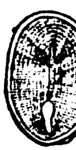

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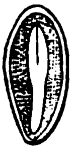

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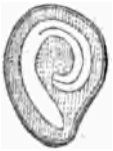

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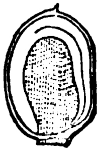

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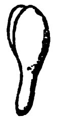
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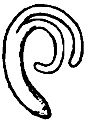
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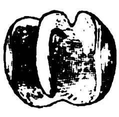
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FIG. 29. Germination of the Morning-Glory more advanced: the upper part only; showing the leafy cotyledons, the second joint of stem with its leaf, and the third with its leaf just developing.

FIG. 30. Section of a seed of a Peony, showing a very small embryo in the albumen, near one end. 31. This embryo detached, and more magnified.

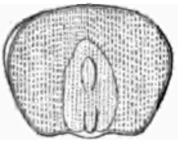
FIG. 32. Section of a seed of Barberry, showing the straight embryo in the middle of the albumen. 33. Its embryo detached.

FIG. 34. Section of a Potato-seed, showing the embryo coiled in the albumen. 35. Its embryo detached.

FIG. 36. Section of the seed of Four-o'clock, showing the embryo coiled round the outside of the albumen. 37. Its embryo detached.

tercup or the Columbine, and in the Peony (Fig. 30, 31), where, however, it is large enough to be distinguished by the naked eye. Nothing is more curious than the various shapes and positions of the embryo in the seed, nor more interesting than to watch its development in germination. One point is still to be noticed, since the botanist considers it of much importance, namely:—

32. **The Kinds of Embryo as to the Number of Cotyledons.** In all the figures, it is easy to see that the embryo, however various in shape, is constructed on one and the same plan;—it consists of a radicle or stemlet, with a pair of cotyledons on its summit. Botanists therefore call it *dicotyledonous*, — an inconveniently long word to express the fact that the embryo has two cotyledons or seed-leaves. In many cases (as in the Buttercup), the cotyledons are indeed so minute, that they are discerned only by the nick in the upper end of the little embryo; yet in germination they grow into a pair of seed-leaves, just as in other cases where they are plain to be seen, as leaves, in the seed. But in Indian Corn (Fig. 40), in Wheat, the Onion, the Iris (Fig. 43), &c., it is well known that only one leaf appears at first from the sprouting seed: in these the embryo has only one cotyledon, and it is therefore termed by the botanists *monocotyledonous*; — an extremely long word, like the other, of Greek derivation, which means *one-cotyledoned.* The rudiments of one or more other leaves are, indeed, commonly present in this sort of embryo, as is plain to see in Indian Corn (Fig. 38 – 40), but they form a bud situated above or within the cotyledon, and enclosed by it more or less completely; so that they evidently belong to the plumule (16); and these leaves appear in the seedling plantlet, each from within its predecessor, and therefore originating higher up on the forming stem (Fig. 42, 44). This will readily be understood from the accompanying figures, with their explanation, which the student may without difficulty verify for him-



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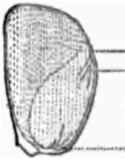

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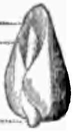

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FIG. 38. A grain of Indian Corn, flatwise, cut away a little, so as to show the embryo, lying on the albumen, which makes the principal bulk of the seed.

FIG. 39. Another grain of Corn, cut through the middle in the opposite direction, dividing the embryo through its thick cotyledon and its plumule, the latter consisting of two leaves, one enclosing the other.

FIG. 40. The embryo of Corn, taken out whole: the thick mass is the cotyledon; the narrow body partly enclosed by it is the plumule; the little projection at its base is the very short radicle enclosed in the sheathing base of the first leaf of the plumule.

self, and should do so, by examining grains of Indian Corn, soaked in water, before and also during germination. In the Onion, Lily, and the Iris (Fig. 43), the monocotyledonous embryo is simpler, consisting apparently of a simple oblong or cylindrical body, in which no distinction of parts is visible: the lower end is *radicle*, and from it grows the root; the rest is a *cotyledon*, which has wrapped up in it a minute *plumule*, or bud, that shows itself when the seeds sprout in germination. The first leaf which appears above ground in all these cases is not the cotyledon. In all seeds with one cotyledon to the embryo, this remains in the seed, or at least its upper part, while its lengthening base comes out, so as to extricate the plumule, which shoots upward, and develops the first leaves of the plantlet. These appear one above or within the other in succession, — as is shown in Fig. 42 and Fig. 44, — the first commonly in the form of a little scale or imperfect leaf; the second or third and the following ones as the real, ordinary leaves of the plant. Meanwhile, from the root end of the embryo, a root (Fig. 41, 44), or soon a whole cluster of roots (Fig. 42), makes its appearance.

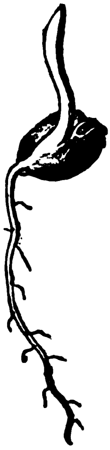

FIG. 41. Grain of Indian Corn in germination.

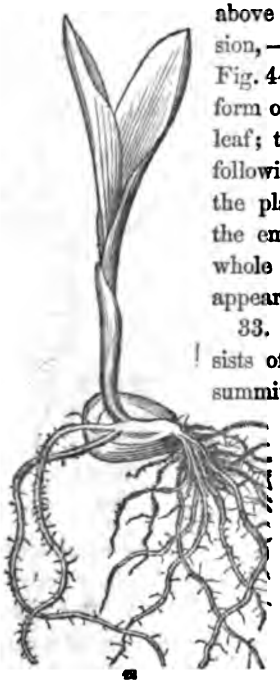

FIG. 42. The same, further advanced.

33. In Pines, and the like, the embryo consists of a radicle or stemlet, bearing on its summit three or four, or often from five to ten slender cotyledons, arranged in a circle (Fig. 45), and expanding at once into a circle of as many green leaves in germination (Fig. 46). Such embryos are said to be *polycotyledonous*, that is, as the word denotes, many-cotyledoned.

34. **Plan of Vegetation.** The student who has understandingly followed the growth of the embryo in the seed into the seedling plantlet, — composed of a root, and a stem of two or three joints, each bearing a

leaf, or a pair (rarely a circle) of leaves, — will have gained a correct idea of the plan of vegetation in general, and have laid a good foundation for a knowledge of the whole structure and physiology of plants. For the plant goes on to grow in the same way throughout, by mere repetitions of what the early germinating plantlet displays to view, — of what was contained, in miniature or in rudiment, in the seed itself. So far as vegetation is concerned (leaving out of view for the present the flower and fruit), the full-grown leafy herb or tree, of whatever size, has nothing, and does nothing, which the seedling plantlet does not have and do. The whole mass of stem or trunk and foliage of the complete plant, even of the largest forest-tree, is composed of a succession or multiplication of similar parts, — one arising from the summit of another, — each, so to say, the offspring of the preceding and the parent of the next.

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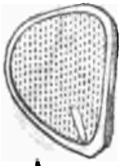

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35. In the same way that the earliest portions of the seedling stem, with the leaves they bear, are successively produced, so, joint by joint in direct succession, a single, simple, leafy stem is developed and carried up. Of such a simple leafy stem many a plant consists (before flowering, at least), — many herbs, such as Sugar-Cane, Indian Corn, the Lily, the tall Banana, the Yucca, &c.; and among trees the Palms and the Cycas (wrongly called Sago Palm) exhibit the same simplicity, their stems, of whatever age, being unbranched columns (Fig. 47). (Growth in diameter is of course to be considered, as well as growth in length. That, and the question *how* growth of any kind takes place, we will consider hereafter.) But more commonly, as soon as the plant has produced a main stem of a certain length, and displayed a certain amount of foliage, it begins to

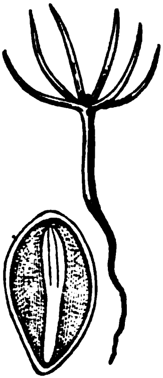

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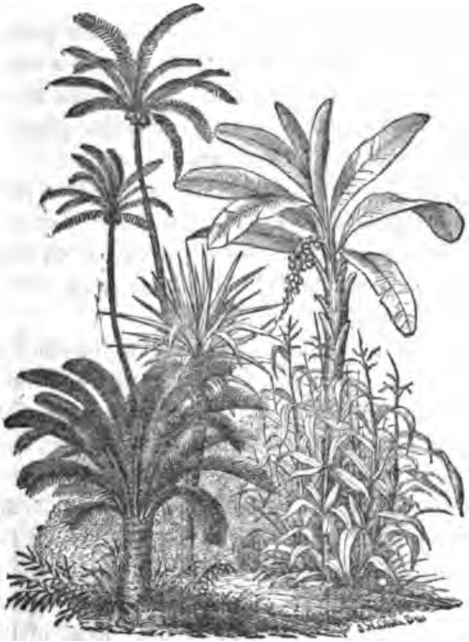
FIG. 43. Section of a seed of the Iris, or Flower-de-Luce, showing its small embryo in the albumen, near the bottom.

FIG. 44. Germinating plantlet of the Iris.

FIG. 45. Section of a seed of a Pine, with its embryo of several cotyledons. 46. Early seedling Pine, with its stemlet, displaying its six seed-leaves.

produce additional stems, that is, *branches*. The branching plant we will consider in the next Lesson.

36. The subjoined figures (Fig. 47) give a view of some forms of *simple-stemmed* vegetation. The figure in the foreground on the left represents a Cycas (wrongly called in the conservatories Sago Palm). Behind it is a Yucca (called Spanish Bayonet at the South) and two Cocoanut Palm-trees. On the right is some Indian Corn, and behind it a Banana.



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LESSON IV.

THE GROWTH OF PLANTS FROM BUDS AND BRANCHES.

37. WE have seen how the plant grows so as to produce a root, and a simple stem with its foliage. Both the root and stem, however, generally branch.

38. The branches of the root arise without any particular order. There is no telling beforehand from what part of a main root they will spring. But the branches of the stem, except in some extraordinary cases, regularly arise from a particular place. Branches or shoots in their undeveloped state are

39. **Buds.** These regularly appear in the *axils* of the leaves, — that is, in the angle formed by the leaf with the stem on the upper side; and as leaves are symmetrically arranged on the stem, the buds, and the branches into which the buds grow, necessarily partake of this symmetry.

40. We do not confine the name of bud to the scaly winter-buds which are so conspicuous on most of our shrubs and trees in winter and spring. It belongs as well to the forming branch of any herb, at its first appearance in the axil of a leaf. In growing, buds lengthen into branches, just as the original stem did from the plumule of the embryo (16) when the seed germinated. Only, while the original stem is implanted in the ground by its root, the branch is implanted on the stem. Branches, therefore, are repetitions of the main stem. They consist of the same parts, — namely, joints of stem and leaves, — growing in the same way. And in the axils of their leaves another crop of buds is naturally produced, giving rise to another generation of branches, which may in turn produce still another generation; and so on, — until the tiny and simple seedling develops into a tall and spreading herb or shrub; or into a massive tree, with its hundreds of annually increasing branches, and its thousands, perhaps millions, of leaves.

41. The herb and the tree grow in the same way. The difference is only in size and duration.

An *Herb* dies altogether, or dies down to the ground, after it has ripened its fruit, or at the approach of winter.

An *annual herb* flowers in the first year, and dies, root and all, after ripening its seed: Mustard, Peppergrass, Buckwheat, &c., are examples.

A *biennial herb*—such as the Turnip, Carrot, Beet, and Cabbage—grows the first season without blossoming, survives the winter, flowers after that, and dies, root and all, when it has ripened its seed.

A *perennial herb* lives and blossoms year after year, but dies down to the ground, or near it, annually,—not, however, quite down to the root: for a portion of the stem, with its buds, still survives; and from these buds the shoots of the following year arise.

A *Shrub* is a perennial plant, with woody stems which continue alive and grow year after year.

A *Tree* differs from a shrub only in its greater size.

42. **The Terminal Bud.** There are herbs, shrubs, and trees which do not branch, as we have already seen (35); but whose stems, even when they live for many years, rise as a simple shaft (Fig. 47). These plants grow by the continued evolution of a bud which crowns the summit of the stem, and which is therefore called the *terminal bud.* This bud is very conspicuous in many branching plants also; as on all the stems or shoots of Maples (Fig. 53), Horsechestnuts (Fig. 48), or Hickories (Fig. 49), of a year old. When they grow, they merely prolong the shoot or stem on which they rest. On these same shoots, however, other buds are to be seen, regularly arranged down their sides. We find them situated just over broad, flattened places, which are the scars left by the fall of the leaf-stalk the autumn previous. Before the fall of the leaf, they would have been seen to occupy their *axils* (39): so they are named

43. **Axillary Buds.** They were formed in these trees early in the summer. Occasionally they grow at the time into branches: at least, some of them are pretty sure to do so, in case the growing terminal bud at the end of the shoot is injured or destroyed. Otherwise they lie dormant until the spring. In many trees or shrubs (such for example as the Sumach and Honey-Locust) these axillary buds do not show themselves until spring; but if

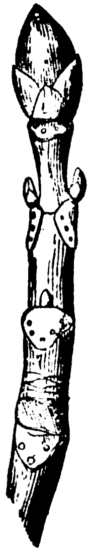

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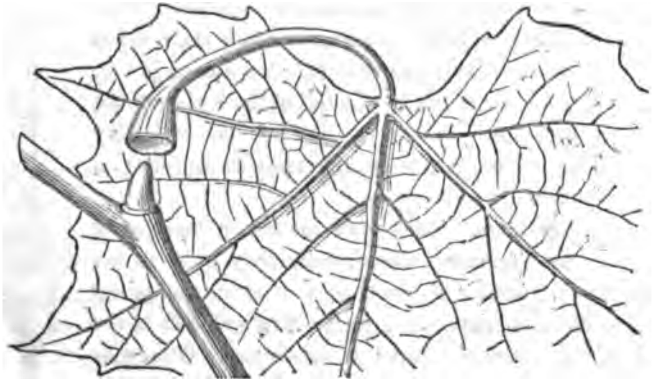
FIG. 48. Shoot of Horsechestnut, of one year's growth, taken in autumn after the leaves have fallen.

searched for, they may be detected, though of small size, hidden under the bark. Sometimes, although early formed, they are concealed all summer long under the base of the leaf-stalk, hollowed out into a sort of inverted cup, like a candle-extinguisher, to cover them; as in the Locust, the Yellow-wood, or more strikingly in the Button-wood or Plane-tree (Fig. 50).

49

44. Such large and conspicuous buds as those of the Horsechestnut, Hickory, and the like, are *scaly;* the scales being a kind of imperfect leaves. The use of the bud-scales is obvious; namely, to protect the tender young parts beneath. To do this more effectually, they are often coated on the outside with a varnish which is impervious to wet, while within they, or the parts they enclose, are thickly clothed with down or wool; not really to keep out the cold of winter, which will of course penetrate the bud in time, but to shield the interior against sudden changes from warm to cold, or from cold to warm, which are equally injurious. Scaly buds commonly belong, as would be expected, to trees and shrubs of northern climates; while *naked* buds are usual in tropical regions, as well as in herbs everywhere which branch during the summer's growth and do not endure the winter.



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45. But *naked buds*, or nearly naked, also occur in several of our own trees and shrubs; sometimes pretty large ones, as those of Hob-

FIG. 49. Annual shoot of the Shagbark Hickory.
FIG. 50. Bud and leaf of the Buttonwood, or American Plane-tree.

blebush (while those of the nearly-related Snowball or High Bush-Cranberry are scaly); but more commonly, when naked buds occur in trees and shrubs of our climate, they are small, and sunk in the bark, as in the Sumac; or even partly buried in the wood until they begin to grow, as in the Honey-Locust.

46. **Vigor of Vegetation from Buds.** Large and strong buds, like those of the Horsechestnut, Hickory, and the like, on inspection will be found to contain several leaves, or pairs of leaves, ready formed, folded and packed away in small compass, just as the seed-leaves are packed away in the seed: they even contain all the blossoms of the ensuing season, plainly visible as small buds. And the stems upon which these buds rest are filled with abundant nourishment, which was deposited the summer before in the wood or in the bark. Under the surface of the soil, or on it, covered with the fallen leaves of autumn, we may find similar strong buds of our perennial herbs, in great variety; while beneath are thick roots, rootstocks, or tubers, charged with a great store of nourishment for their use. As we regard these, we shall readily perceive how it is that vegetation shoots forth so vigorously in the spring of the year, and clothes the bare and lately frozen surface of the soil, as well as the naked boughs of trees, almost at once with a covering of the freshest green, and often with brilliant blossoms. Everything was prepared, and even formed, beforehand: the short joints of stem in the bud have only to lengthen, and to separate the leaves from each other so that they may unfold and grow. Only a small part of the vegetation of the season comes directly from the seed, and none of the earliest vernal vegetation. This is all from buds which have lived through the winter.

47. This growth from buds, in manifold variety, is as interesting a subject of study as the growth of the plantlet from the seed, and is still easier to observe. We have only room here to sketch the general plan; earnestly recommending the student to examine attentively their mode of growth in all the common trees and shrubs, when they shoot forth in spring. The growth of the terminal bud prolongs the stem or branch: the growth of axillary buds produces branches.

48. **The Arrangement of Branches** is accordingly the same as of axillary buds; and the arrangement of these buds is the same as that of the leaves. Now leaves are arranged in two principal ways: they are either *opposite* or *alternate*. Leaves are *opposite* when

there are two borne on the same joint of stem, as in the Horsechestnut, Maple (Fig. 7), Honeysuckle (Fig. 132), Lilac, &c.; the two leaves in such cases being always *opposite* each other, that is, on exactly opposite sides of the stem. Here of course the buds in their axils are opposite, as we observe in Fig. 48, where the leaves have fallen, but their place is shown by the scars. And the branches into which the buds grow are likewise opposite each other in pairs.

49. Leaves are *alternate* when there is only one from each joint of stem, as in the Oak (Fig. 22), Lime-tree, Poplar, Buttonwood (Fig. 50), Morning-Glory (Fig. 8), — not counting the seed-leaves, which of course are opposite, there being a pair of them; also in Indian Corn (Fig. 42), and Iris (Fig. 44). Consequently the axillary buds are also alternate, as in Hickory (Fig. 49); and the branches they form alternate, — making a different kind of spray from the other mode, — one branch shooting on the one side of the stem and the next on some other. For in the alternate arrangement no leaf is on the same side of the stem as the one next above or next below it.

50. Branches, therefore, are arranged with symmetry; and the mode of branching of the whole tree may be foretold by a glance at the arrangement of the leaves on the seedling or stem of the first year. This arrangement of the branches according to that of the leaves is always plainly to be recognized; but the symmetry of branches is rarely complete. This is owing to several causes; mainly to one, viz.: —

51. It never happens that all the buds grow. If they did, there would be as many branches in any year as there were leaves the year before. And of those which do begin to grow, a large portion perish, sooner or later, for want of nourishment or for want of light. Those which first begin to grow have an advantage, which they are apt to keep, taking to themselves the nourishment of the stem, and starving the weaker buds.

52. In the Horsechestnut (Fig. 48), Hickory (Fig. 49), Magnolia, and most other trees with large scaly buds, the terminal bud is the strongest, and has the advantage in growth, and next in strength are the upper axillary buds: while the former continues the shoot of the last year, some of the latter give rise to branches, while the rest fail to grow. In the Lilac also, the upper axillary buds are stronger than the lower; but the terminal bud rarely

appears at all; in its place the uppermost pair of axillary buds grow, and so each stem branches every year into two; making a repeatedly two-forked ramification.

53. In these and many similar trees and shrubs, most of the shoots make a *definite annual growth*. That is, each shoot of the season develops rapidly from a strong bud in spring, — a bud which generally contains, already formed in miniature, all or a great part of the leaves and joints of stem it is to produce, — makes its whole growth in length in the course of a few weeks, or sometimes even in a few days, and then forms and ripens its buds for the next year's similar rapid growth.

54. On the other hand, the Locust, Honey-Locust, Sumac, and, among smaller plants, the Rose and Raspberry, make an *indefinite annual growth*. That is, their stems grow on all summer long, until stopped by the frosts of autumn or some other cause; consequently they form and ripen no terminal bud protected by scales, and the upper axillary buds are produced so late in the season that they have no time to mature, nor has the wood time to solidify and ripen. Such stems therefore commonly die at the top in winter, or at least all their upper buds are small and feeble; and the growth of the succeeding year takes place mainly from the lower axillary buds, which are more mature. Most of our perennial herbs grow in this way, their stems dying down to the ground every year: the part beneath, however, is charged with vigorous buds, well protected by the kindly covering of earth, ready for the next year's vegetation.

55. In these last-mentioned cases there is, of course, no single main stem, continued year after year in a direct line, but the trunk is soon lost in the branches; and when they grow into trees, these commonly have rounded or spreading tops. Of such trees with *deliquescent* stems, — that is, with the trunk dissolved, as it were, into the successively divided branches, the common American Elm (Fig. 54) furnishes a good illustration.

56. On the other hand, the main stem of Pines and Spruces, as it begins in the seedling, unless destroyed by some injury, is carried on in a direct line throughout the whole growth of the tree, by the development year after year of a terminal bud: this forms a single, uninterrupted shaft, — an *excurrent* trunk, which can never be confounded with the branches that proceed from it. Of such *spiry* or *spire-shaped* trees, the Firs or Spruces are the most perfect and

familiar illustrations (Fig. 54); but some other trees with strong terminal buds exhibit the same character for a certain time, and in a less marked degree.

57. **Latent Buds.** Some of the axillary buds grow the following year into branches; but a larger number do not (51). These do not necessarily die. Often they survive in a latent state for some years, visible on the surface of the branch, or are smaller and concealed under the bark, resting on the surface of the wood: and when at any time the other buds or branches happen to be killed, these older latent buds grow to supply their place; — as is often seen when the foliage and young shoots of a tree are destroyed by insects. The new shoots seen springing directly out of large stems may sometimes originate from such latent buds, which have preserved their life for years. But commonly these arise from

58. **Adventitious Buds.** These are buds which certain shrubs and trees produce anywhere on the surface of the wood, especially where it has been injured. They give rise to the slender twigs which often feather so beautifully the sides of great branches or trunks of our American Elms. They sometimes form on the root, which naturally is destitute of buds; and they are sure to appear on the trunks and roots of Willows, Poplars, and Chestnuts, when these are wounded or mutilated. Indeed Osier-Willows are *pollarded*, or cut off, from time to time, by the cultivator, for the purpose of producing a crop of slender adventitious twigs, suitable for basket-work. Such branches, being altogether irregular, of course interfere with the natural symmetry of the tree (50). Another cause of irregularity, in certain trees and shrubs, is the formation of what are called

59. **Accessory or Supernumerary Buds.** There are cases where two, three, or more buds spring from the axil of a leaf, instead of the single one which is ordinarily found there. Sometimes they are placed one over the other, as in the Aristolochia or Pipe-Vine, and in the Tartarian Honeysuckle (Fig. 51); also in the Honey-Locust, and in the Walnut and Butternut (Fig. 52), where the upper supernumerary bud is a good way out of the axil and above the others. And this is here stronger

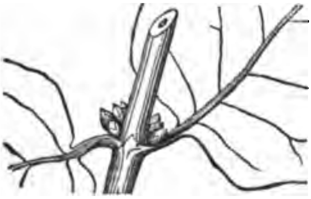

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FIG. 51. Tartarian Honeysuckle, with three accessory buds in one axil.

than the others, and grows into a branch which is considerably out of the axil, while the lower and smaller ones commonly do not grow at all. In other cases the three buds stand side by side in the axil, as in the Hawthorn, and the Red Maple (Fig. 53). If these were all to grow into branches, they would stifle or jostle each other. But some of them are commonly flower-buds: in the Red Maple, only the middle one is a leaf-bud, and it does not grow until after those on each side of it have expanded the blossoms they contain.

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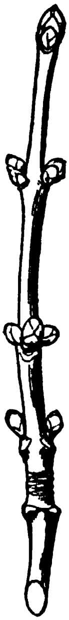

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60. **Sorts of Buds.** It may be useful to enumerate the kinds of buds which have now been mentioned, referring back to the paragraphs in which the peculiarities of each are explained. Buds, then, are either *terminal* or *lateral*. They are

Terminal when they rest on the apex of a stem (42). The earliest terminal bud is the *plumule* of the embryo (16).

Lateral, when they appear on the side of a stem:—of which the only regular kind is the

Axillary (43), namely, those which are situated in the axils of leaves.

Accessory or *Supernumerary* (59), when two or more occur in addition to the ordinary axillary bud.

Adventitious (58), when they occur out of the axils and without order, on stems or roots, or even on leaves. Any of these kinds may be, either

Naked, when without coverings; or *scaly*, when protected by scales (44, 45).

Latent, when they survive long without growing, and commonly without being visible externally (57).

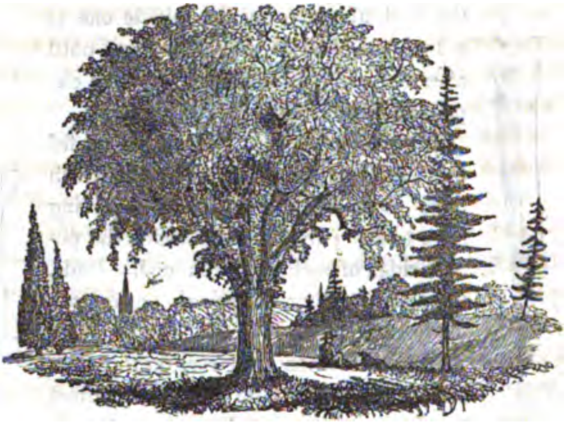
Leaf-buds, when they contain leaves, and develop into a leafy shoot.

Flower-buds, when they contain blossoms, and no leaves, as the

FIG. 52. Butternut branch, with accessory buds, the uppermost above the axil.
FIG. 53. Red-Maple branch, with accessory buds placed side by side.

side-buds of the Red-Maple, or when they are undeveloped blossoms. These we shall have to consider hereafter.

Figure 54 represents a spreading-topped tree (American Elm), the stem dividing off into branches; and some spiry trees (Spruces on the right hand, and two of the Arbor-Vitæ on the left) with excurrent stems.



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LESSON V.

MORPHOLOGY (i.e. VARIOUS SORTS AND FORMS) OF ROOTS.

61. **Morphology**, as the name (derived from two Greek words) denotes, is the doctrine of forms. In treating of forms in plants, the botanist is not confined to an enumeration or description of the shapes or sorts that occur, — which would be a dull and tedious business, — but he endeavors to bring to view *the relations between one form and another;* and this is an interesting study.

62. Botanists give particular names to all the parts of plants, and also particular terms to express their principal varieties in form. They use these terms with great precision and advantage in describing the species or kinds of plants. They must therefore be defined and explained in our books. But it would be a great waste of time

for the young student to learn them by rote. The student should rather consider the connection between one form and another; and notice how the one simple plan of the plant, as it has already been illustrated, is worked out in the greatest variety of ways, through the manifold diversity of forms which each of its three organs of vegetation — root, stem, and leaf — is made to assume.

63. This we are now ready to do. That is, having obtained a general idea of vegetation, by tracing the plant from the seed and the bud into the herb, shrub, or tree, we proceed to contemplate the principal forms under which these three organs occur in different plants, or in different parts of the same plant; or, in other words, to study the *morphology* of the root, stem, and leaves.

64. Of these three organs, the root is the simplest and the least varied in its modifications. Still it exhibits some widely different kinds. Going back to the beginning, we commence with

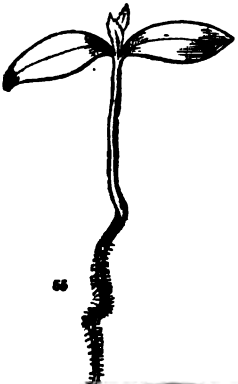
65. **The simple Primary Root,** which most plants send down from the root-end of the embryo as it grows from the seed; as we have seen in the Maple (Fig. 5 – 7), Morning-Glory (Fig. 8 and 28), Beech (Fig. 14, 15), Oak and Buckeye (Fig. 22 – 24), &c. This, if it goes on to grow, makes a *main* or *tap* root, from which side-branches here and there proceed. Some plants keep this main root throughout their whole life, and send off only small side branches; as in the Carrot (Fig. 58) and Radish (Fig. 59): and in some trees, like the Oak, it takes the lead of the side-branches for many years, unless accidentally injured, as a strong tap-root. But commonly the main root divides off very soon, and is lost in the branches. We have already seen, also, that there may be at the beginning

66. **Multiple Primary Roots.** We have noticed them in the Pumpkin (Fig. 10), in the Pea (Fig. 20), and in Indian Corn (Fig. 42). That is, several roots have started all at once, or nearly so, from the seedling stem, and formed a bundle or cluster (a *fascicled* root, as it is called), in place of one main root. The Bean, as we observe in Fig. 18, begins with a main root; but some of its branches soon overtake it, and a cluster of roots is formed.

67. **Absorption of Moisture by Roots.** The branches of roots as they grow commonly branch again and again, into smaller roots or *rootlets;* in this way very much increasing the surface by which the plant connects itself with the earth, and absorbs moisture from it. The whole surface of the root absorbs, so long as it is fresh and new; and the newer the roots and rootlets are, the more freely do they

imbibe. Accordingly, as long as the plant grows above ground, and expands fresh foliage, from which moisture much of the time largely escapes into the air, so long it continues to extend and multiply its roots in the soil beneath, renewing and increasing the fresh surface for absorbing moisture, in proportion to the demand from above. And when growth ceases above ground, and the leaves die and fall, or no longer act, then the roots generally stop growing, and their soft and tender tips harden. From this period, therefore, until growth begins anew the next spring, is the best time for transplanting; especially for trees and shrubs, and herbs so large that they cannot well be removed without injuring the roots very much.

68. We see, on considering a moment, that an herb or a tree consists of two great surfaces, with a narrow part or trunk between them, — one surface spread out in the air, and the other in the soil. These two surfaces bear a certain proportion to each other; and the upper draws largely on the lower for moisture. Now, when the leaves fall from the tree in autumn, the vast surface exposed to the air is reduced to a very small part of what it was before; and the remainder, being covered with a firm bark, cannot lose much by evaporation. In common herbs the whole surface above ground perishes in autumn; and many of the rootlets die at the same time, or soon afterwards. So that the living vegetable is reduced for the time to the smallest compass, — to the thousandth or hundred-thousandth part of what it was shortly before, — and what remains alive rests in a dormant state, and may now be transplanted without much danger of harm. If any should doubt whether there is so great a difference between the summer and the winter size of plants, let them compare a lily-bulb with the full-grown Lily, or calculate the surface of foliage which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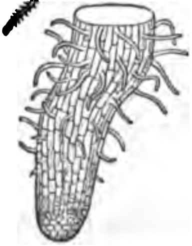
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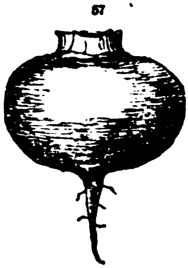
FIG. 55. Seedling Maple, of the natural size, showing the root-hairs. 56. A bit of the end of the root magnified.

a tree exposes to the air, as compared with the surface of its twigs.

69. The absorbing surface of roots is very much greater than it appears to be, on account of the root-hairs, or slender fibrils, which abound on the fresh and new parts of roots. These may be seen with an ordinary magnifying-glass, or even by the naked eye in many cases; as in the root of a seedling Maple (Fig. 55), where the surface is thickly clothed with them. They are not rootlets of a smaller sort; but, when more magnified, are seen to be mere elongations of the surface of the root into slender tubes, which through their very delicate walls imbibe moisture from the soil with great avidity. They are commonly much longer than those shown in Fig. 56, which represents only the very tip of a root moderately magnified. Small as they are individually, yet the whole amount of absorbing surface added to the rootlets by the countless numbers of these tiny tubes is very great.



70. Roots intended mainly for absorbing branch freely, and are slender or thread-like. When the root is principally of this character it is said to be *fibrous;* as in Indian Corn (Fig. 42), and other grain, and to some extent in all annual plants (41).

71. **The Root as a Storehouse of Food.** In biennial and many perennial herbs (41), the root answers an additional purpose. In the course of the season it becomes a storehouse of nourishment, and enlarges or thickens as it receives the accumulation. Such roots are said to be *fleshy;* and different names are applied to them according to

FIG. 57, 58, 59. Forms of fleshy or thickened roots.

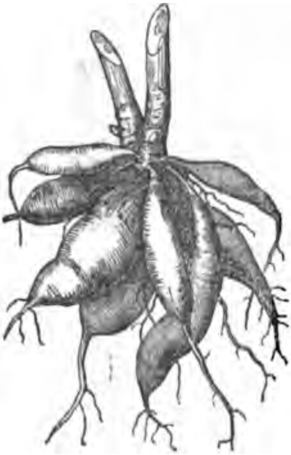
their shapes. We may divide them all into two kinds; 1st, those consisting of one main root, and 2d, those without any main root.

72. The first are merely different shapes of the *tap-root*; which is

Conical, when it thickens most at the crown, or where it joins the stem, and tapers regularly downwards to a point, as in the Common Beet, the Parsnip, and Carrot (Fig. 58):

Turnip-shaped or *napiform*, when greatly thickened above; but abruptly becoming slender below; as the Turnip (Fig. 57): and,

Spindle-shaped, or *fusiform*, when thickest in the middle and tapering to both ends; as the common Radish (Fig. 59).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73. In the second kind, where there is no main root, the store of nourishing matter may be distributed throughout the branches or cluster of roots generally, or it may be accumulated in some of them, as we see in the *tuberous* roots of the Sweet Potato, the common Peony, and the Dahlia (Fig. 60).

74. All but the last of these illustrations are taken from *biennial* plants. These grow with a large tuft of leaves next the ground, and accumulate nourishment all the first summer, and store up all they produce beyond what is wanted at the time in their great root, which lives over the winter. We know very well what use man and other animals make of this store of food, in the form of starch, sugar, jelly, and the like. From the second year's growth we may learn what use the plant itself makes of it. The new shoots then feed upon it, and use it to form with great rapidity branches, flower-stalks, blossoms, fruit, and seed; and, having used it up, the whole plant dies when the seeds have ripened.

75. In the same way the nourishment contained in the separate tuberous roots of the Sweet Potato and the Dahlia (Fig. 60) is fed upon in the spring by the buds of the stem they belong to; and as they are emptied of their contents, they likewise die and decay. But meanwhile similar stores of nourishment, produced by the second year's vegetation, are deposited in new roots, which live through the

FIG. 60. Clustered tuberous roots of the Dahlia, with the bottom of the stem they belong to.

next winter, and sustain the third spring's growth, and so on; — these plants being *perennial* (41), or lasting year after year, though each particular root lives little more than one year.

76. Many things which commonly pass for roots are not really roots at all. Common potatoes are tuberous parts of stems, while sweet potatoes are roots, like those of the Dahlia (Fig. 60). The difference between them will more plainly appear in the next Lesson.

77. **Secondary Roots.** So far we have considered only the original or primary root, — that which proceeded from the lower end of the first joint of stem in the plantlet springing from the seed, — and its subdivisions. We may now remark, that any other part of the stem will produce roots just as well, whenever favorably situated for it; that is, when covered by the soil, which provides the darkness and the moisture which is congenial to them. For these *secondary* roots, as they may be called, partake of the ordinary disposition of the organ: they avoid the light, and seek to bury themselves in the ground. In Indian Corn we see roots early striking from the second and the succeeding joints of stem under ground, more abundantly than from the first joint (Fig. 42). And all stems that keep up a connection with the soil — such as those which creep along on or beneath its surface — are sure to strike root from almost every joint. So will most branches when bent to the ground, and covered with the soil: and even cuttings from the branches of most plants can be made to do so, if properly managed. Propagation by buds depends upon this. That is, a piece of a plant which has stem and leaves, either developed or in the bud, may be made to produce roots, and so become an independent plant.

78. In many plants the disposition to strike root is so strong, that they even will spring from the stem above ground. In Indian Corn, for example, it is well known that roots grow, not only from all those joints round which the earth is heaped in hoeing, but also from those several inches above the soil: and other plants produce them from stems or branches high in the air. Such roots are called

79. **Aerial Roots.** All the most striking examples of these are met with, as we might expect, in warmer and damper climates than ours, and especially in deep forests which shut out much of the light; this being unfavorable to roots. The Mangrove of tropical shores, which occurs on our own southern borders; the Sugar Cane, from which roots strike just as in Indian Corn, only from higher up the stem; the Pandanus, called Screw Pine (not from its resemblance to a

Pine-tree, but because it is like a Pine-apple plant); and the famous Banyan of India, and some other Fig-trees, furnish the most remarkable examples of roots, which strike from the stem or the branches in the open air, and at length reach the ground, and bury themselves, when they act in the same manner as ordinary roots.

80. Some of our own common plants, however, produce small *aerial rootlets;* not for absorbing nourishment, but for climbing. By these rootlets, that shoot out abundantly from the side of the stems and branches, the Trumpet Creeper, the Ivy of Europe, and our Poison Rhus, — here called Poison Ivy, — fasten themselves firmly to walls, or the trunks of trees, often ascending to a great height. Here roots serve the same purpose that tendrils do in the Grape-Vine and Virginia Creeper. Another form, and the most aerial of all roots, since they never reach the ground, are those of

81. **Epiphytes, or Air-Plants.** These are called by the first name (which means growing on plants), because they are generally found upon the trunks and branches of trees; — not that they draw any nourishment from them, for their roots merely adhere to the bark, and they flourish just as well upon dead wood or any other convenient support. They are called *air-plants* because they really live altogether upon what they get from the air, as they have no connection with the soil. Hundreds of air-plants grow all around us without attracting any attention, because they are small or humble. Such are the Lichens and Mosses that abound on the trunks or boughs of trees, especially on the shaded side, and on old walls, fences, or rocks, from which they obtain no nourishment. But this name is commonly applied only to the larger, flower-bearing plants which live in this way. These belong to warm and damp parts of the world, where there is always plenty of moisture in the air. The greater part belong to the Orchis family and to the Pine-Apple family; and among them are some of the handsomest flowers known. We have two or three flowering air-plants in the Southern States, though they are not showy ones. One of them is an Epidendrum growing on the boughs of the Great-flowered Magnolia: another is the Long-Moss, or Black Moss, so called, — although it is no Moss at all, — which hangs from the branches of Oaks and Pines in all the warm parts of the Southern States. (Fig 61 represents both of these. The upper is the Epidendrum conopseum; the lower, the Black Moss, Tillandsia usneoides.)

82. **Parasitic Plants** exhibit roots under yet another remarkable

aspect. For these are not merely fixed upon other plants, as air-plants are, but strike their roots, or what answer to roots, into them, and feed on their juices. Not only Moulds and Blights (which are plants of very low organization) live in this predacious way, but many flowering herbs, and even shrubs. One of the latter is the Mistletoe, the seed of which germinates on the bough of the tree where it falls or is left by birds; and the forming root penetrates the bark and engrafts itself into the wood, to which it becomes united as firmly as a natural branch to its parent stem; and indeed the parasite lives just as if it were a branch of the tree it grows and feeds on. A most common parasitic herb is the Dodder; which abounds in low grounds everywhere in summer, and coils its long and slender leafless, yellowish stems — resembling tangled threads of yarn — round and round the stalks of other plants; wherever they touch piercing the bark with minute and very short rootlets in the form of suckers, which draw out the nourishing juices of the plants laid hold of. Other parasitic plants, like the Beech-drops and Pine-sap, fasten their roots under ground upon the roots of neighboring plants, and rob them of their rich juices.

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LESSON VI.

MORPHOLOGY OF STEMS AND BRANCHES.

83. THE growth of the stem in length, and the formation of branches, have been considered already. Their growth in thickness we may study to more advantage in a later Lesson. The very various forms which they assume will now occupy our attention, — beginning with

84. **The Forms of Stems and Branches above ground.** The principal differences as regards size and duration have been mentioned before (41); namely, the obvious distinction of plants into herbs, shrubs, and trees, which depends upon the duration and size of the stem. The stem is accordingly

Herbaceous, when it dies down to the ground every year, or after blossoming.

Suffrutescent, when the bottom of the stem above the soil is a little woody, and inclined to live from year to year.

Suffruticose, when low stems are decidedly woody below, but herbaceous above.

Fruticose, or *shrubby*, when woody, living from year to year, and of considerable size, — not, however, more than three or four times the height of a man.

Arborescent, when tree-like in appearance, or approaching a tree in size.

Arboreous, when forming a proper tree trunk.

85. When the stem or branches rise above ground and are apparent to view, the plant is said to be *caulescent* (that is, to have a *caulis* or true stem). When there is no evident stem above ground, but only leaves or leaf-stalks and flower-stalks, the plant is said to be *acaulescent*, i. e. *stemless*, as in the Crocus, Bloodroot, common Violets, &c., and in the Beet, Carrot, and Radish (Fig. 59), for the first season. There is a stem, however, in all such cases, only it remains on or beneath the ground, and is sometimes very short. Of course leaves and flowers do not arise from the root. These concealed sorts of stem we will presently study.

86. The direction taken by stems, &c., or their mode of growth,

gives rise to several terms, which may be briefly mentioned: — such as

Diffuse, when loosely spreading in all directions.

Declined, when turned or bending over to one side.

Decumbent, reclining on the ground, as if too weak to stand.

Assurgent or *ascending*, when rising obliquely upwards.

Procumbent or *prostrate*, lying flat on the ground from the first.

Creeping, or *repent*, when prostrate stems on or just beneath the ground strike root as they grow; as does the White Clover, the little Partridge-berry, &c.

Climbing, or *scandent*, when stems rise by clinging to other objects for support, — whether by *tendrils*, as do the Pea, Grape-Vine, and Virginia Creeper (Fig. 62); by their twisting leaf-stalks, as the Virgin's Bower; or by rootlets, like the Ivy, Poison Ivy, and Trumpet Creeper (80).

Twining, or *voluble*, when stems rise by coiling themselves spirally around other stems or supports; like the Morning-Glory and the Bean.

87. Certain forms of stems have received distinct names. The jointed stem of Grasses and Sedges is called by botanists a *culm;* and the peculiar scaly trunk of Palms and the like (Fig. 47) is sometimes called a *caudex*. A few forms of branches the gardener distinguishes by particular names; and they are interesting from their serving for the natural propagation of plants from buds, and for suggesting ways by which we artificially multiply plants that would not propagate themselves without the gardener's aid. These are *suckers*, *offsets*, *stolons*, and *runners*.

88. **Suckers** are ascending branches rising from stems under ground, such as are produced so abundantly by the Rose, Raspberry, and other plants said to multiply "by the root." If we uncover them, we see at once the great difference between these subterranean branches and real roots. They are only creeping branches under ground. Remarking how the upright shoots from these branches become separate plants, simply by the dying off of the connecting under-ground stems, the gardener expedites the result by cutting them through with his spade. That is, he propagates the plant "by division."

89. **Stolons** are trailing or reclining branches above ground, which strike root where they touch the soil, and then send up a vigorous shoot, which has roots of its own, and becomes an independent plant when the connecting part dies, as it does after a while. The Currant

and the Gooseberry naturally multiply in this way, as well as by suckers (which we see are just the same thing, only the connecting part is concealed under ground). They must have suggested the operation of *layering*, or bending down and covering with earth branches which do not naturally make stolons; and after they have taken root, as they almost always will, the gardener cuts through the connecting stem, and so converts a rooting branch into a separate plant.

90. **Offsets**, like those of the Houseleek, are only short stolons, with a crown of leaves at the end.

91. **Runners**, of which the Strawberry presents the most familiar example, are a long and slender, tendril-like, leafless form of creeping branches. Each runner, after having grown to its full length, strikes root from the tip, and fixes it to the ground, then forms a bud there, which develops into a tuft of leaves, and so gives rise to a new plant, which sends out new runners to act in the same way. In this manner a single Strawberry plant will spread over a large space, or produce a great number of plants, in the course of the summer; — all connected at first by the slender runners; but these die in the following winter, if not before, and leave the plants as so many separate individuals.

92. **Tendrils** are branches of a very slender sort, like runners, not destined like them for propagation, and therefore always destitute of buds or leaves, but intended for climbing. Those of the Grape-Vine, of the Virginia Creeper (Fig. 62), and of the Cucumber and

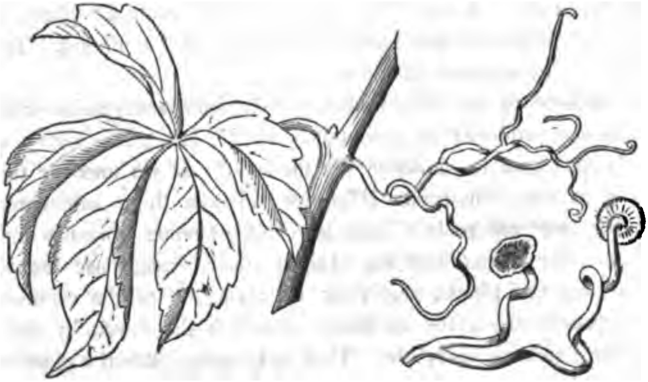


FIG. 62. Piece of the stem of Virginia Creeper, bearing a leaf and a tendril. 63. Tips of a tendril, about the natural size, showing the disks by which they hold fast to walls, &c.

Squash tribe are familiar illustrations. The tendril commonly grows straight and outstretched until it reaches some neighboring support, such as a stem, when its apex hooks around it to secure a hold; then the whole tendril shortens itself by coiling up spirally, and so draws the shoot of the growing plant nearer to the supporting object. When the Virginia Creeper climbs the side of a building or the smooth bark of a tree, which the tendrils cannot lay hold of in the usual way, their tips expand into a flat disk or sucker (Fig. 62, 63), which adheres very firmly to the wall or bark, enabling the plant to climb over and cover such a surface, as readily as the Ivy does by means of its sucker-like little rootlets. The same result is effected by different organs, in the one case by branches in the form of tendrils; in the other, by roots.

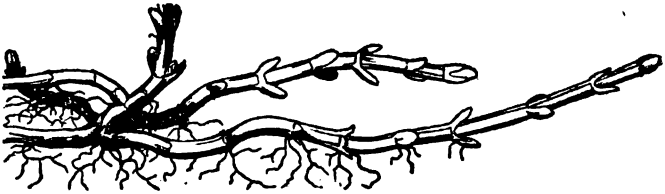
93. Tendrils, however, are not always branches; some are leaves, or parts of leaves, as those of the Pea (Fig. 20). Their nature in each case is to be learned from their position, whether it be that of a leaf or of a branch. In the same way

94. **Spines or Thorns** sometimes represent leaves, as in the Barberry, where their nature is shown by their situation *outside* of an axillary bud or branch. In other words, here they have a bud in their axil, and are therefore leaves; so we shall have to mention them in another place. Most commonly spines are stunted and hardened branches, arising from the axils of leaves, as in the Hawthorn and Pear. A neglected Pear-tree or Plum-tree shows every gradation between ordinary branches and thorns. Thorns sometimes branch, their branches partaking of the same spiny character: in this way those on the trunks of Honey-Locust trees (produced from adventitious buds, 58) become exceedingly complicated and horrid. The thorns on young shoots of the Honey-Locust may appear somewhat puzzling at first view; for they are situated some distance above the axil of the leaf. Here the thorn comes from the uppermost of several supernumerary buds (59). *Prickles*, such as those of the Rose and Blackberry, must not be confounded with thorns: these have not the nature of branches, and have no connection with the wood; but are only growths of the bark. When we strip off the bark, the prickles go with it.

95. Still stranger forms of stems and branches than any of these are met with in some tribes of plants, such as Cactuses (Fig. 76). These will be more readily understood after we have considered some of the commoner forms of

96. **Subterranean Stems and Branches.** These are very numerous and various; but they are commonly overlooked, or else confounded with roots. From their situation they are out of the sight of the superficial observer: but if sought for and examined, they will well repay the student's attention. For the vegetation that is carried on under ground is hardly less varied, and no less interesting and important, than that which meets our view above ground. All their forms may be referred to four principal kinds; namely, the *Rhizoma* or *Rootstock*, the *Tuber*, the *Corm*, and the *Bulb*.

97. **The Rootstock, or Rhizoma**, in its simplest form, is merely a creeping stem or branch (86) growing beneath the surface of the soil, or partly covered by it. Of this kind are the so-called *creeping*, *running*, or *scaly roots*, such as those by which the Mint (Fig. 64), the Scotch Rose, the Couch-grass or Quick-grass, and many other plants, spread so rapidly and widely, "by the root," as it is said. That these are really *stems*, and not roots, is evident from the way in which they grow; from their consisting of a succession of joints; and from the leaves which they bear on each joint (or *node*, as the botanist calls the place from which leaves arise), in the form of small scales, just like the lowest ones on the upright stem next the ground. Like other stems, they also produce buds in the axils of these scales, showing the scales to be leaves; whereas real roots bear neither leaves nor axillary buds. Placed, as they are, in the damp and dark soil, such stems naturally produce roots, just as the creeping stem does where it lies on the surface of the ground; but the whole appearance of these roots, their downward growth, and their mode of branching, are very different from that of the subterranean stem they spring from.



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98. It is easy to see why plants with these running rootstocks take such rapid and wide possession of the soil,—often becoming great pests to farmers,—and why they are so hard to get rid of. They are

FIG. 64. Rootstocks, or creeping subterranean branches, of the Peppermint.

always perennials (41); the subterranean shoots live over the first winter, if not longer, and are provided with vigorous buds at every joint. Some of these buds grow in spring into upright stems, bearing foliage, to elaborate the plant's crude food into nourishment, and at length produce blossoms for reproduction by seed; while many others, fed by nourishment supplied from above, form a new generation of subterranean shoots; and this is repeated over and over in the course of the season or in succeeding years. Meanwhile as the subterranean shoots increase in number, the older ones, connecting the series of generations into one body, die off year by year, liberating the already rooted side-branches as so many separate plants; and so on indefinitely. Cutting these running rootstocks into pieces, therefore, by the hoe or the plough, far from destroying the plant, only accelerates the propagation; it converts one many-branched plant into a great number of separate individuals. Even if you divide the shoots into as many pieces as there are joints of stem, each piece (Fig. 65) is already a plantlet, with its roots and with a bud in the axil of its scale-like leaf (either latent or apparent), and having prepared nourishment enough in the bit of stem to develop this bud into a leafy stem; and so a single plant is all the more speedily converted into a multitude. Such plants as the Quick-grass accordingly realize the fable of the Hydra; as fast as one of its many branches is cut off, twice as many, or more, spring up in its stead. Whereas, when the subterranean parts are only roots, cutting away the stem completely destroys the plant, except in the rather rare cases where the root produces adventitious buds (58).

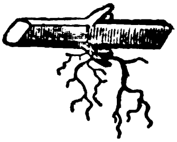
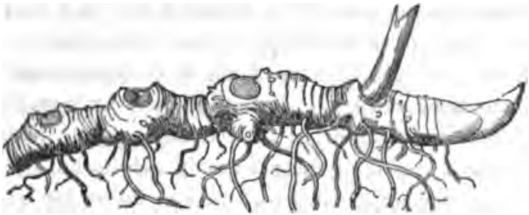


FIG. 65. A piece of the running rootstock of the Peppermint, with its node or joint, and an axillary bud ready to grow.

99. The more nourishment rootstocks contain, the more readily do separate portions, furnished with buds, become independent plants. It is to such underground stems, thickened with a large amount of starch, or some similar nourishing matter stored up in their tissue, that the name of *rhizoma* or rootstock is commonly applied; — such, for example, as those of the Sweet Flag or Calamus, of Ginger, of Iris or Flower-de-luce (Fig. 133), and of the Solomon's Seal (Fig. 66).

100. The rootstocks of the common sorts of Iris of the gardens usually lie on the surface of the ground, partly uncovered; and they bear real leaves (Fig. 133); which closely overlap each other;

the joints (i. e. the *internodes*, or spaces between each leaf) being very short. As the leaves die, year by year, and decay, a scar left in the form of a ring marks the place where each leaf was attached. Instead of leaves, rootstocks buried under ground commonly bear scales, like those of the Mint (Fig. 64), which are imperfect leaves.



66

101. Some rootstocks are marked with large round scars of a different sort, like those of the Solomon's Seal (Fig. 66), which gave this name to the plant, from their looking something like the impression of a seal upon wax. Here the rootstock sends up every spring an herbaceous stalk or stem, which bears the foliage and flowers, and dies in autumn; and the *seal* is the circular scar left by the death and separation of the dead stalk from the living rootstock. As but one of these is formed each year, they mark the limits of a year's growth. The bud at the end of the rootstock in the figure, which was taken in summer, will grow the next spring into the stalk of the season, which, dying in autumn, will leave a similar scar, while another bud will be formed farther on, crowning the ever-advancing summit or growing end of the stem.

102. As each year's growth of stem, in all these cases, makes its own roots, it soon becomes independent of the older parts. And after a certain age, a portion dies off behind, every year, about as fast as it increases at the growing end; — death following life with equal and certain step, with only a narrow interval between. In vigorous plants of Solomon's Seal or Iris, the living rootstock is several inches or a foot in length; while in the short rootstock of

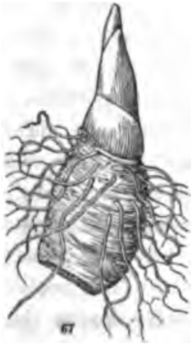


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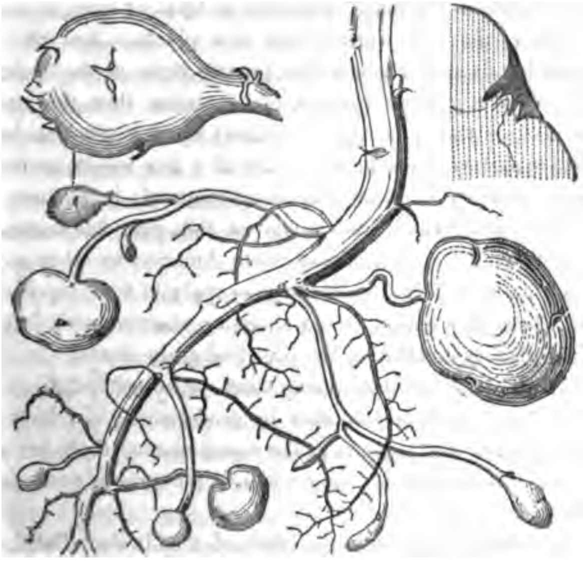
FIG. 66. Rootstock of Solomon's Seal, with the bottom of the stalk of the season, and the bud for the next year's growth.

FIG. 67. The very short rootstock and bud of a Trillium or Birthroot.

Trillium or Birthroot (Fig. 67) life is reduced to a very narrow span, only an inch or less intervening between death beneath and young life in the strong bud annually renewed at the summit.

103. **A Tuber** is a thickened portion of a rootstock. When slender subterranean branches, like those of the Quick-grass or Mint (Fig. 64), become enlarged at the growing end by the accumulation there of an abundance of solid nourishing matter, *tubers* are produced, like those of the Nut-grass of the Southern States (which accordingly becomes a greater pest even than the Quick-grass), and of the Jerusalem Artichoke, and the Potato. The whole formation may be seen at a glance in Figure 68, which represents the subterranean growth of a Potato-plant, and shows the tubers in all their stages, from shoots just beginning to enlarge at the tip, up to fully-formed potatoes. And Fig. 69, — one of the forming tubers moderately magnified, — plainly shows the leaves of this thickening shoot, in the form of little scales. It is under these scales that the *eyes* appear (Fig. 70): and these are evidently axillary buds (43).

69 68 70



104. Let us glance for a moment at the economy or mode of life of the Potato-plant, and similar vegetables, as shown in the *mor-*

FIG. 68. Forming tubers of the Potato. 69. One of the very young potatoes, moderately magnified. 70. Slice of a portion through an eye, more magnified.

phology of the branches,—that is, in the different forms they appear under, and the purposes they serve. The Potato-plant has three principal forms of branches:—1. Those that bear ordinary leaves, expanded in the air, to digest what they gather from it and what the roots gather from the soil, and convert it into nourishment. 2. After a while a second set of branches at the summit of the plant bear flowers, which form fruit and seed out of a portion of the nourishment which the leaves have prepared. 3. But a larger part of this nourishment, while in a liquid state, is carried down the stem, into a third sort of branches under ground, and accumulated in the form of starch at their extremities, which become tubers, or depositories of prepared solid food;—just as in the Turnip, Carrot, Dahlia, &c. (Fig. 57 – 60), it is deposited in the root. The use of the store of food is obvious enough. In the autumn the whole plant dies, except the seeds (if it formed them) and the tubers; and the latter are left disconnected in the ground. Just as that small portion of nourishing matter which is deposited in the seed (3, and Fig. 34) feeds the embryo when it germinates, so the much larger portion deposited in the tuber nourishes its buds, or eyes, when they likewise grow, the next spring, into new plants. And the great supply enables them to shoot with a greater vigor at the beginning, and to produce a greater amount of vegetation than the seedling plant could do in the same space of time; which vegetation in turn may prepare and store up, in the course of a few weeks or months, the largest quantity of solid nourishing material, in a form most available for food. Taking advantage of this, man has transported the Potato from the cool Andes of South America to other cool climates, and makes it yield him a copious supply of food, especially in countries where the season is too short, or the summer's heat too little, for profitably cultivating the principal grain-plants.

105. All the sorts of subterranean stems or branches distinguished by botanists pass into one another by gradations. We have seen how nearly related the tuber is to the rootstock, and there are many cases in which it is difficult to say which is the proper name to use. So likewise,

106. **The Corm, or Solid Bulb,** like that of the Indian Turnip and the Crocus (Fig. 71), is just a very short and thick rootstock; as will be seen by comparing Fig. 71 with Fig. 67. Indeed, it grows so very little in length, that it is often much broader than long, as in the Indian Turnip, and the Cyclamen of our greenhouses. Corms

are usually upright, producing buds on their upper surface and roots from the lower. But (as we see in the Crocus here figured) buds may shoot from just above any of the faint cross lines or rings, which are the scars left by the death and decay of the sheathing bases of former leaves. That is, these are axillary buds. In these extraordinary (just as in ordinary) stems, the buds are either axillary or terminal. The whole mode of growth is just the same, only the corm does not increase in length faster than it does in thickness. After a few years some of the buds grow into new corms at the expense of the old one; the young ones taking the nourishment from the parent, and storing up a large part of it in their own tissue. When exhausted in this way, as well as by flowering, the old corm dies, and its shrivelled and decaying remains may be found at the side of or beneath the present generation, as we see in the Crocus (Fig. 71).

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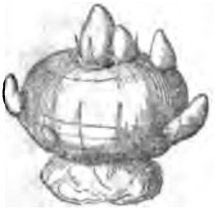

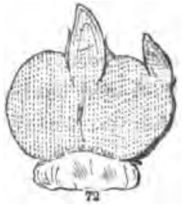

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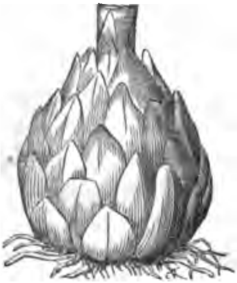
107. The corm of a Crocus is commonly covered with a thin and dry, scaly or fibrous husk, consisting of the dead remains of the bases of former leaves. When this husk consists of many scales, there is scarcely any distinction left between the corm and

108. **The Bulb.** This is an extremely short subterranean stem, usually much broader than high, producing roots from underneath, and covered with leaves or the bases of leaves, in the form of thickened scales. It is, therefore, the same as a corm, or solid bulb, only it bears an abundance of leaves or scales, which make up the greater part of its bulk. Or we may regard it as a bud, with thick and fleshy scales. Compare a Lily-bulb (Fig. 73) with the strong scaly buds of the Hickory and Horsechestnut (Fig. 48 and 49), and the resemblance will be apparent enough.

109. Bulbs serve the same purpose as tubers, rootstocks, or corms. The main difference is, that in these the store of food for future growth is deposited in the stem; while in the bulb, the greater part is deposited in the bases of the leaves, changing them into thick scales, which closely overlap or enclose one another, because the stem does not elongate enough to separate them. That the scales

FIG. 71. Corm or solid bulb of a Crocus. 72. The same, cut through lengthwise.

of the bulb are the bases of leaves may be seen at once by following any of the ground-leaves (root-leaves as they are incorrectly called) down to their origin in the bulb. Fig. 75 represents one of them from the White Lily; the thickened base, which makes a scale, being cut off below, to show its thickness. After having lasted its time and served its purpose as foliage, the green leaf dies, down to the thickened base, which remains as a scale of the bulb. And year after year, as the bulb grows from the centre, to produce the vegetation and the flowers of the season, the outer scales yield up their store of nourishment for the purpose, and perish.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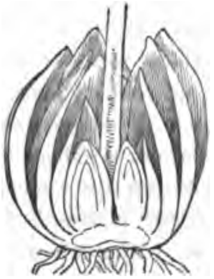
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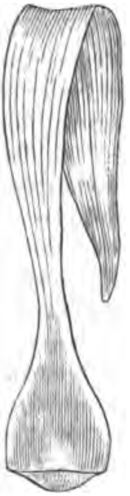
110. Each scale, being a leaf, may have a bud in its axil. Some of these buds grow into leafy and flowering stems above ground: others grow into new bulbs, feeding on the parent, and at length destroying it, in the same way that corms do; as just described (106).

111. When the scales are broad and enwrap all that is within so as to form a succession of coats, one over another, the bulb is said to be *tunicated* or *coated.* The Tulip, Hyacinth, Leek, and Onion afford such familiar examples of coated bulbs that no figure is needed. When the scales are narrow and separate, as in the Lily (Fig. 73), the bulb is said to be *scaly.*

112. **Bulblets** are small bulbs formed above ground on some plants; as in the axils of the leaves of the common bulbiferous Lily of the gardens, and often in the flower-clusters of the Leek and Onion. They are plainly nothing but bulbs with thickened scales. They never grow into branches, but detach themselves when full grown, and fall to the ground, to take root there and form new plants.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113. From the few illustrations already given, attentive students

FIG. 73. Bulb of the Meadow or Canada Lily. 74. The same, cut through lengthwise.

FIG. 75. A lower leaf of White Lily, with its base under ground thickened into a bulb-scale.

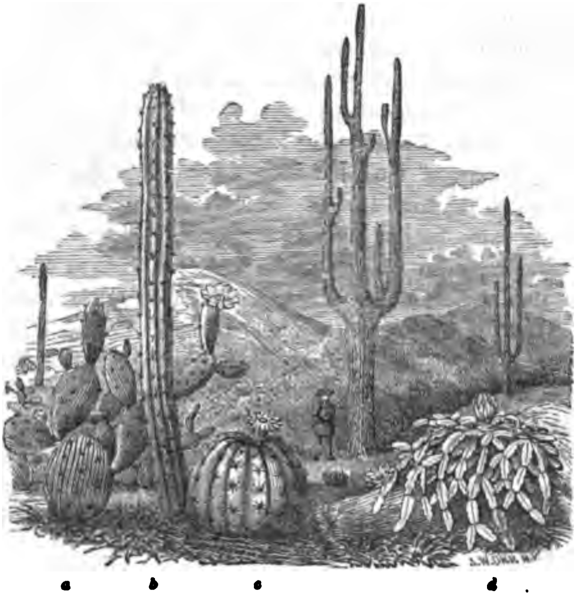
can hardly fail to obtain a good idea of what is meant by *morphology* in Botany; and they will be able to apply its simple principles for themselves to all forms of vegetation. They will find it very interesting to identify all these various subterranean forms with the common plan of vegetation above ground. There is the same structure, and the same mode of growth in reality, however different in appearance, and however changed the form, to suit particular conditions, or to accomplish particular ends. It is plain to see, already, that the plant is constructed *according to a plan*, — a very simple one, — which is exhibited by all vegetables, by the extraordinary no less than by the ordinary kinds; and that the same organ may appear under a great many different shapes, and fulfil very different offices.

114. These extraordinary shapes are not confined to subterranean vegetation. They are all repeated in various sorts of *fleshy plants;* in the Houseleek, Aloe, Agave (Fig. 82), and in the many and strange shapes which the Cactus family exhibit (Fig. 76); shapes which imitate rootstocks, tubers, corms, &c. above ground. All these we may regard as

115. **Consolidated Forms of Vegetation.** While ordinary plants are constructed on the plan of great spread of surface (131), these are formed on the plan of the least possible amount of surface in proportion to their bulk. The Cereus genus of Cactuses, for example, consisting of solid columnar trunks (Fig. 76, *b*), may be likened to rootstocks. A green rind serves the purpose of foliage; but the surface is as nothing compared with an ordinary leafy plant of the same bulk. Compare, for instance, the largest Cactus known, the Giant Cereus of the Gila River (Fig. 76, in the background), which rises to the height of fifty or sixty feet, with a common leafy tree of the same height, such as that in Fig. 54, and estimate how vastly greater, even without the foliage, the surface of the latter is than that of the former. Compare, in the same view, an Opuntia or Prickly-Pear Cactus, its stem and branches formed of a succession of thick and flattened joints (Fig. 76, *a*), which may be likened to tubers, or an Epiphyllum (*d*), with shorter and flatter joints, with an ordinary leafy shrub or herb of equal size. And finally, in Melon-Cactuses or Echinocactus (*c*), with their globular or bulb-like shapes, we have plants in the compactest shape; their spherical figure being such as to expose the least possible amount of its bulk to the air.

116. These *consolidated plants* are evidently adapted and designed

for very *dry regions;* and in such only are they found. Similarly, bulbous and corm-bearing plants, and the like, are examples of a form of vegetation which in the growing season may expand a large surface to the air and light, while during the period of rest the living vegetable is reduced to a globe, or solid form of the least possible surface; and this is protected by its outer coats of dead and dry scales, as well as by its situation under ground. Such plants exhibit another and very similar adaptation to a season of drought. And they mainly belong to countries (such as Southern Africa, and parts of the interior of Oregon and California) which have a long hot season during which little or no rain falls, when, their stalks and foliage above and their roots beneath being early cut off by drought, the plants rest securely in their compact bulbs, filled with nourishment, and retaining their moisture with great tenacity, until the rainy season comes round. Then they shoot forth leaves and flowers with wonderful rapidity, and what was perhaps a desert of arid sand becomes green with foliage and gay with blossoms, almost in a day. This will be more perfectly understood when the nature and use of foliage have been more fully considered. (Fig. 76 represents several forms of Cactus vegetation.)



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LESSON VII.

MORPHOLOGY OF LEAVES.

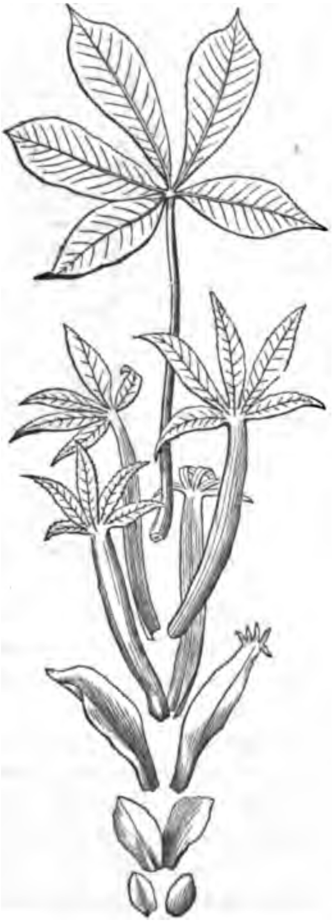
117. In describing the subterranean forms of the stem, we have been led to notice already some of the remarkable forms under which leaves occur; namely, as *scales*, sometimes small and thin, as those of the rootstocks of the Quick-grass, or the Mint (Fig. 64), sometimes large and thick, as those of bulbs (Fig. 73 – 75), where they are commonly larger than the stem they belong to. We have seen, too, in the second Lesson, the seed-leaves (or cotyledons) in forms as unlike foliage as possible; and in the third Lesson we have spoken of bud-scales as a sort of leaves. So that the botanist recognizes the leaf under other forms than that of foliage.

118. We may call foliage the *natural form* of leaves, and look upon the other sorts as *special forms*, — as *transformed* leaves: by this term meaning only that what would have been ordinary leaves under other circumstances (as, for instance, those on shoots of Mint, Fig. 64, had these grown upright in the air, instead of creeping under ground) are developed in special forms to serve some particular purpose. For the Great Author of Nature, having designed plants upon one simple plan, just adapts this plan to all cases. So, whenever any special purpose is to be accomplished, no new instruments or organs are created for it, but one of the three general organs of the vegetable, *root*, *stem*, or *leaf*, is made to serve the purpose, and is adapted to it by taking some peculiar form.

119. It is the study of the varied forms under this view that constitutes *Morphology* (61), and gives to this part of Botany such great interest. We have already seen stems and roots under a great variety of forms. But leaves appear under more various and widely different forms, and answer a greater variety of purposes, than do both the other organs of the plant put together. We have to consider, then, *leaves as foliage*, and *leaves as something else than foliage*. As we have just been noticing cases of leaves that are not foliage, we may consider these first, and enumerate the principal kinds.

120. **Leaves as Depositories of Food.** Of these we have had plenty of instances in the seed-leaves, such as those of the Almond, Apple-

seed (Fig. 11), Beech (Fig. 13 – 15), the Bean and Pea (Fig. 16 – 20), the Oak (Fig. 21, 22), and Horsechestnut (Fig. 23, 24); where the food upon which the plantlet feeds when it springs from the seed is stored up in its cotyledons or first leaves. And we have noticed how very unlike foliage such leaves are. Yet in some cases, as in the Pumpkin (Fig. 10), they actually grow into green leaves as they get rid of their burden.



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121. **Bulb-Scales** (Fig. 73 – 75) offer another instance, which we were considering at the close of the last Lesson. Here a part of the nourishment prepared in the foliage of one year is stored up in the scales, or subterranean thickened leaves, for the early growth and flowering of the next year; and this enables the flowers to appear before the leaves, or as soon as they do; as in Hyacinths, Snowdrops, and many bulbous plants.

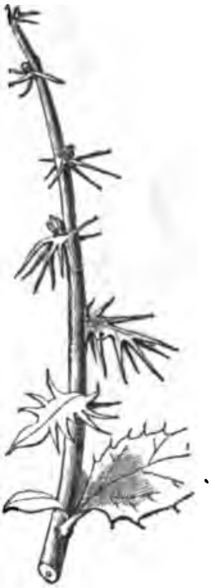
122. **Leaves as Bud-scales, &c.** True to its nature, the stem produces leaves even under ground, where they cannot serve as foliage, and where often, as on rootstocks and tubers (97 – 103), they are not of any use that we know of. In such cases they usually appear as thin scales. So the first leaves of the stems of herbs, as they sprout from the ground, are generally mere scales, such as those of an Asparagus shoot; and such are the first leaves on the stem of the seedling Oak (Fig. 22) and the Pea (Fig. 20). Similar scales, however, often serve an important purpose; as when they form the covering of buds, where they protect the tender parts within (44). That bud-scales are

FIG. 77. Leaves of a developing bud of the Low Sweet Buckeye (Æsculus parviflora), showing a nearly complete set of gradations from a scale to a compound leaf of five leaflets.

leaves is plainly shown, in many cases, by the gradual transition between them and the first foliage of the shoot. The Common Lilac and the Shell-bark Hickory are good instances of the sort. But the best illustration is furnished by the Low Sweet Buckeye of the Southern States, which is often cultivated as an ornamental shrub. From one and the same growing bud we may often find all the gradations which are shown in Fig. 77.

123. **Leaves as Spines** occur in several plants. The most familiar instance is that of the Common Barberry. In almost any summer shoot, most of the gradations may be seen between the ordinary leaves, with sharp bristly teeth, and leaves which are reduced to a branching spine or thorn, as shown in Fig. 78. The fact that the spines of the Barberry produce a leaf-bud in their axil also proves them to be leaves.

124. **Leaves as Tendrils** are to be seen in the Pea and the Vetch (Fig. 20, 127), where the upper part of each leaf becomes a tendril, which the plant uses to climb by; and in one kind of Vetch the whole leaf is such a tendril.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125. **Leaves as Pitchers**, or hollow tubes, are familiar to us in the common Pitcher-plant or Side-saddle Flower (Sarracenia, Fig. 79) of our bogs. These pitchers are generally half-full of water, in which flies and other insects are drowned, often in such numbers as to make a rich manure for the plant, no doubt; though we can hardly imagine this to be the design of the pitcher. Nor do we perceive here any need of a contrivance to hold water, since the roots of these plants are always well supplied by the wet bogs where they grow.

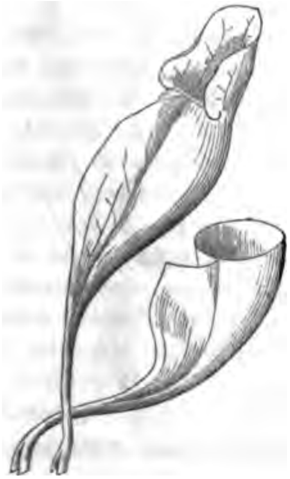
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FIG. 78. Summer shoot of Barberry, showing the transition of leaves into spines.

FIG. 79. Leaf of Sarracenia purpurea, entire, and another with the upper part cut off.

126. **Leaves as Fly-traps.** Insects are caught in another way, and more expertly, by the most extraordinary of all the plants of this country, the Dionæa or Venus's Fly-trap, which grows in the sandy bogs around Wilmington, North Carolina. Here (Fig. 81) each leaf bears at its summit an appendage which opens and shuts, in shape something like a steel-trap, and operating much like one. For when open, as it commonly is when the sun shines, no sooner does a fly alight on its surface, and brush against any one of the several long bristles that grow there, than the trap suddenly closes, often capturing the intruder, pressing it all the harder for its struggles, and commonly depriving it of life. After all movement has ceased within, the trap slowly opens, and is ready for another capture. Why this plant catches flies, we cannot pretend to say. How the thing is done, and how various other movements are made by plants, — some as quick as in this case, others very slow, but all equally wonderful, — must be considered in a future Lesson.

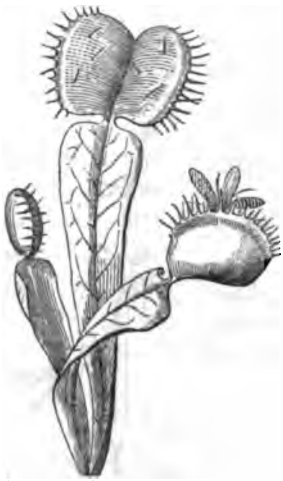

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FIG. 81. Leaves of Dionæa; the trap in one of them open, in the others closed.

127. **Leaves serving both Ordinary and Special Purposes.** Let us now remark, that the same leaf frequently answers its general purpose, as foliage, and some special purpose besides. For example, in the Dionæa, the lower part of the leaf, and probably the whole of it, acts as foliage, while the appendage serves its mysterious purpose as a fly-catcher. In the Pea and Vetch (Fig. 20, 127), the lower part of the leaf is foliage, the upper a tendril. In the Pitcher-plants of the Indian Archipelago (Nepenthes, Fig. 80) which are not rare in conservatories, the lower part of the leaf is expanded and acts as foliage;

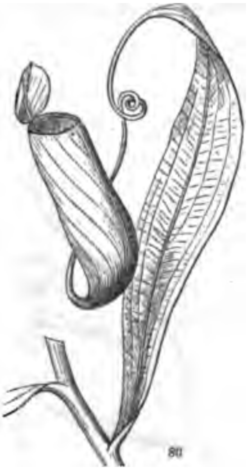

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FIG. 80. Leaf of Nepenthes: leaf, tendril, and pitcher combined.

farther on, it is contracted into a tendril, enabling the plant to climb; the end of this tendril is then expanded into a pitcher, of five or six inches in length, and on the end of this is a lid, which exactly closes the mouth of the pitcher until after it is full grown, when the lid opens by a hinge! But the whole is only one leaf.

128. So in the root-leaves of the Tulip or the Lily (Fig. 75), while the green leaf is preparing nourishment throughout the growing season, its base under ground is thickened into a reservoir for storing up a good part of the nourishment for next year's use.

129. Finally, the whole leaf often serves both as foliage, to prepare nourishment, and as a depository to store it up. This takes place in all fleshy-leaved plants, such as the Houseleek, the Ice-plant, and various sorts of Mesembryanthemum, in the Live-for-ever of the gardens to some extent, and very strikingly in the Aloe, and in the Century-plant. In the latter it is only the green surface of these large and thick leaves (of three to five feet in length on a strong plant, and often three to six inches thick near the base) which acts as foliage; the whole interior is white, like the interior of a potato, and almost as heavily loaded with starch and other nourishing matter. (Fig. 82 represents a young Century-plant, Agave Americana.)

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LESSON VIII.

MORPHOLOGY OF LEAVES AS FOLIAGE.

130. HAVING in the last Lesson glanced at some of the special or extraordinary forms and uses of leaves, we now return to leaves in their ordinary condition, namely, as foliage. We regard this as the natural state of leaves. For although they may be turned to account in other and very various ways, as we have just seen, still their proper office in vegetation is to serve as foliage. In this view we may regard

131. **Leaves as a Contrivance for Increasing the Surface** of that large part of the plant which is exposed to the light and the air. This is shown by their expanded form, and ordinarily slight thickness in comparison with their length and breath. While a Melon-Cactus (115, Fig. 76) is a striking example of a plant with the least possible amount of surface for its bulk, a repeatedly branching leafy herb or tree presents the largest possible extent of surface to the air. The actual amount of surface presented by a tree in full leaf is much larger than one would be apt to suppose. Thus, the Washington Elm at Cambridge — a tree of no extraordinary size — was some years ago estimated to produce a crop of seven millions of leaves, exposing a surface of 200,000 square feet, or about five acres, of foliage.

132. What is done by the foliage we shall have to explain in another place. Under the present head we are to consider ordinary leaves as to their *parts* and their *shapes*.

133. **The Parts of the Leaf.** The principal part of a leaf is the blade, or expanded portion, one face of which naturally looks toward the sky, the other towards the earth. The blade is often raised on a stalk of its own, and on each side of the stalk at its base there is sometimes an appendage called a *stipule*. A complete leaf, therefore consists of a *blade* (Fig. 83, *b*), a *foot-stalk* or *leaf-stalk*, called the *petiole* (*p*), and a pair of *stipules* (*st*). See also Fig. 136.

134. It is the blade which we are now to describe. This, as being the essential and conspicuous part, we generally regard as the leaf: and it is only when we have to particularize, that we speak of the *blade*, or *lamina*, of the leaf.

135. Without here entering upon the subject of the anatomy of the leaf, we may remark, that leaves consist of two sorts of material, viz.: 1. the *green pulp*, or *parenchyma;* and 2. the *fibrous framework*, or skeleton, which extends throughout the soft green pulp and supports it, giving the leaf a strength and firmness which it would not otherwise possess. Besides, the whole surface is covered with a transparent skin, called the *epidermis*, like that which covers the surface of the shoots, &c.

136. The framework consists of *wood*, — a fibrous and tough material which runs from the stem through the leaf-stalk, when there is one, in the form of parallel threads or bundles of fibres; and in the blade these spread out in a horizontal direction, to form the *ribs* and *veins* of the leaf. The stout main branches of the framework (like those in Fig. 50) are called the *ribs*. When there is only one, as in Fig. 83, &c., or a middle one decidedly larger than the rest, it is called the *midrib*. The smaller divisions are termed *veins;* and their still smaller subdivisions, *veinlets*.

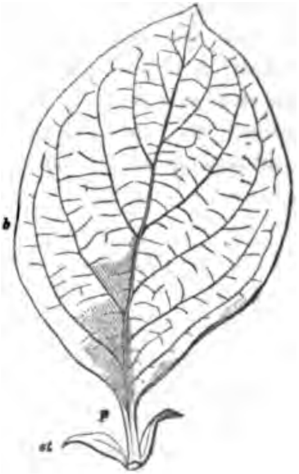

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FIG. 83. Leaf of the Quince: *b*, blade; *p*, petiole; *st*, stipules.

137. The latter subdivide again and again, until they become so fine that they are invisible to the naked eye. The fibres of which they are composed are hollow; forming tubes by which the sap is brought into the leaves and carried to every part. The arrangement of the framework in the blade is termed the

138. **Venation**, or mode of veining. This corresponds so completely with the general shape of the leaf, and with the kind of division when the blade is divided or lobed, that the readiest way to study and arrange the forms of leaves is first to consider their veining.

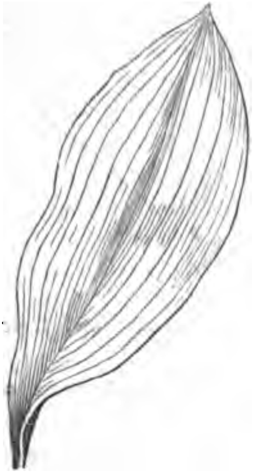
139. Various as it appears in different leaves, the veining is all reducible to two principal kinds; namely, the *parallel-veined* and the *netted-veined*.

140. In *netted-veined* (also called *reticulated*) leaves, the veins branch off from the main rib or ribs, divide into finer and finer

veinlets, and the branches unite with each other to form meshes of network. That is, they *anastomose*, as anatomists say of the veins and arteries of the body. The Quince-leaf, in Fig. 83, shows this kind of veining in a leaf with a single rib. The Maple, Basswood, and Buttonwood (Fig. 50) show it in leaves of several ribs.

141. In *parallel-veined* leaves, the whole framework consists of slender ribs or veins, which run parallel with each other, or nearly so, from the base to the point of the leaf, not dividing and subdividing, nor forming meshes, except by very minute cross-veinlets. The leaf of any grass, or that of the Lily of the Valley (Fig. 84) will furnish a good illustration.

142. Such simple, parallel veins Linnæus, to distinguish them, called *nerves*, and parallel-veined leaves are still commonly called *nerved* leaves; while those of the other kind are said to be *veined*; — terms which it is convenient to use, although these "nerves" and "veins" are all the same thing, and have no likeness to the *nerves* of animals.



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143. *Netted-veined* leaves belong to plants which have a pair of seed-leaves or cotyledons, such as the Maple (Fig. 1 – 7), Beech (Fig. 15), Pea and Bean (Fig. 18, 20), and most of the illustrations in the first and second Lessons. While *parallel-veined* or *nerved* leaves belong to plants with one cotyledon or true seed-leaf; such as the Iris (Fig. 134) and Indian Corn (Fig. 42). So that a mere glance at the leaves of the tree or herb enables one to tell what the structure of the embryo is, and to refer the plant to one or the other of these two grand classes, — which is a great convenience. For generally when plants differ from each other in some one important respect, they differ correspondingly in other respects as well.

144. Parallel-veined leaves are of two sorts; one kind, and the commonest, having the ribs or nerves all running from the base to the point of the leaf, as in the examples already given; while in another kind they run from a midrib to the margin; as in the com-

FIG. 84. A (parallel-veined) leaf of the Lily of the Valley.

mon Pickerel-weed of our ponds, in the Banana (Fig. 47), and many similar plants of warm climates.

145. Netted-veined leaves are also of two sorts, as is shown in the examples already referred to. In one case the veins all rise from a single rib (the midrib), as in Fig. 83. Such leaves are called *feather-veined* or *pinnately-veined;* both terms meaning the same thing, namely, that the veins are arranged on the sides of the rib like the plume of a feather on each side of the shaft.

146. In the other case (as in the Buttonwood, Fig. 50, Maple, &c.), the veins branch off from three, five, seven, or nine ribs, which spread from the top of the leaf-stalk, and run through the blade like the toes of a web-footed bird. Hence these are said to be *palmately* or *digitately* veined, or (since the ribs diverge like rays from a centre) *radiate-veined.*

147. Since the general outline of leaves accords with the framework or skeleton, it is plain that *feather-veined* leaves will incline to elongated shapes, or at least will be longer than broad; while in *radiate-veined* leaves more rounded forms are to be expected. A glance at the following figures shows this. Whether we consider the veins of the leaf to be adapted to the shape of the blade, or the green pulp to be moulded to the framework, is not very material. Either way, the outline of each leaf corresponds with the mode of spreading, the extent, and the relative length of the veins. Thus, in oblong or elliptical leaves of the feather-veined sort (Fig. 87, 88), the principal veins are nearly equal in length; while in ovate and heart-shaped leaves (Fig. 89, 90), those below the middle are longest; and in leaves which widen upwards (Fig. 91 – 94), the veins above the middle are longer than the others.

148. Let us pass on, without particular reference to the kind of veining, to enumerate the principal

149. **Forms of Leaves as to General Outline.** It is necessary to give names to the principal shapes, and to define them rather precisely, since they afford the easiest marks for distinguishing species. The same terms are used for all other flattened parts as well, such as the petals of the flowers; so that they make up a great part of the descriptive language of Botany. We do not mention the names of common plants which exhibit these various shapes. It will be a good exercise for young students to look them up and apply them.

150. Beginning with the narrower and proceeding to the broadest forms, a leaf is said to be

Linear (Fig. 85), when narrow, several times longer than wide, and of the same breadth throughout.

Lanceolate, or *lance-shaped*, when several times longer than wide, and tapering upwards (Fig. 86), or both upwards and downwards.

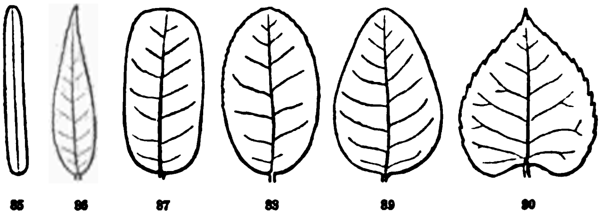
Oblong (Fig. 87), when nearly twice or thrice as long as broad.

Elliptical (Fig. 88) is oblong with a flowing outline, the two ends alike in width.

Oval is the same as broadly elliptical, or elliptical with the breadth considerably more than half the length.

Ovate (Fig. 89), when the outline is like a section of a hen's-egg lengthwise, the broader end downward.

Orbicular, or *rotund* (Fig. 102), circular in outline, or nearly so.



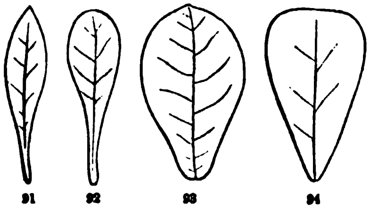
151. When the leaf tapers towards the base, instead of upwards, it may be

Oblanceolate (Fig. 91), which is lance-shaped, with the more tapering end downwards;

Spatulate (Fig. 92), rounded above and long and narrow below, like a spatula;

Obovate (Fig. 93), or inversely ovate, that is, ovate with the narrower end down; or

Cuneate, or *cuneiform*, that is, *wedge-shaped* (Fig. 94), broad above and tapering by straight lines to an acute angle at the base.



152. **As to the Base**, its shape characterizes several forms, such as

Cordate, or *heart-shaped* (Fig. 90, 99, 8), when a leaf of an ovate form, or something like it, has the outline of its rounded base turned in (forming a notch or *sinus*) where the stalk is attached.

Reniform, or *kidney-shaped* (Fig. 100), like the last, only rounder and broader than long.

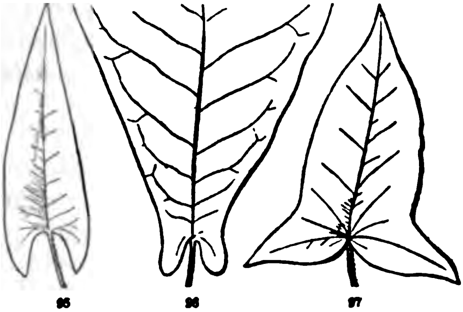
FIG. 85-90. Various forms of feather-veined leaves.

FIG. 91. Oblanceolate, 92. spatulate, 93. obovate, 94. wedge-shaped, feather-veined leaves.

Auriculate, or *eared*, having a pair of small and blunt projections, or *ears*, at the base, as in one species of Magnolia (Fig. 96).

Sagittate, or *arrow-shaped*, where such ears are pointed and turned downwards, while the main body of the blade tapers upwards to a point, as in the common Sagittaria or Arrow-head, and in the Arrow-leaved Polygonum (Fig. 95).

Hastate, or *halberd-shaped*, when such lobes at the base point outwards, giving the leaf the shape of the halberd of the olden time, as in another Polygonum (Fig. 97).



Peltate, or *shield-shaped*, (Fig. 102,) is the name applied to a curious modification of the leaf, commonly of a rounded form, where the footstalk is attached to the lower surface, instead of the base, and therefore is naturally likened to a shield borne by the outstretched arm. The common Watershield, the Nelumbium, and the White Water-lily, and also the Mandrake, exhibit this sort of leaf. On comparing the shield-shaped leaf of the common Marsh Pennywort (Fig. 102) with that of another common species (Fig. 101), we see at once what this peculiarity means. A shield-shaped leaf is like a

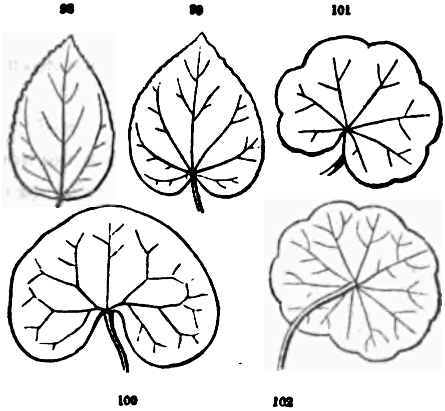


FIG. 95. Sagittate, 96. auriculate, 97. halberd-shaped, leaves.
FIG. 98 – 102. Various forms of radiate-veined leaves.

kidney-shaped (Fig. 100) or other rounded leaf, with the margins at the base brought together and united.

153. **As to the Apex,** the following terms express the principal variations.

Acuminate, *pointed*, or *taper-pointed*, when the summit is more or less prolonged into a narrowed or tapering point, as in Fig. 97.

Acute, when ending in an acute angle or not prolonged point, as in Fig. 104, 98, 95, &c.

Obtuse, when with a blunt or rounded point, as in Fig. 105, 89, &c.

Truncate, with the end as if cut off square, as in Fig. 106, 94.

Retuse, with the rounded summit slightly indented, forming a very shallow notch, as in Fig. 107.

Emarginate, or *notched*, indented at the end more decidedly, as in Fig. 108.

Obcordate, that is, inversely heart-shaped, where an obovate leaf is more deeply notched at the end (Fig. 109), as in White Clover and Wood-sorrel; so as to resemble a cordate leaf (Fig. 99) inverted.

Cuspidate, tipped with a sharp and rigid point; as in Fig. 110.

Mucronate, abruptly tipped with a small and short point, like a projection of the midrib; as in Fig. 111.

Aristate, *awn-pointed*, and *bristle-pointed*, are terms used when this mucronate point is extended into a longer bristle-form or other slender appendage.

The first six of these terms can be applied to the lower as well as to the upper end of a leaf or other organ. The others belong to the apex only.

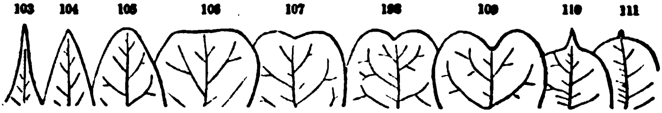


FIG. 103-111. Forms of the apex of leaves.

LESSON IX.

MORPHOLOGY OF LEAVES AS FOLIAGE.—SIMPLE AND COMPOUND LEAVES, STIPULES, ETC.

154. In the foregoing Lesson leaves have been treated of in their simplest form, namely, as consisting of a single blade. But in many cases the leaf is divided into a number of separate blades. That is,

155. **Leaves are either Simple or Compound.** They are said to be *simple*, when the blade is all of one piece: they are *compound*, when the blade consists of two or more separate pieces, borne upon a common leaf-stalk. And between these two kinds every intermediate gradation is to be met with. This will appear as we proceed to notice the principal

156. **Forms of Leaves as to particular Outline** or degree of division. In this respect, leaves are said to be

Entire, when their general outline is completely filled out, so that the margin is an even line, without any teeth or notches; as in Fig. 83, 84, 100, &c.

Serrate, or *saw-toothed*, when the margin only is cut into sharp teeth, like those of a saw, and pointing forwards; as in Fig. 112: also 90, &c.

Dentate, or *toothed*, when such teeth point outwards, instead of forwards; as in Fig. 113.

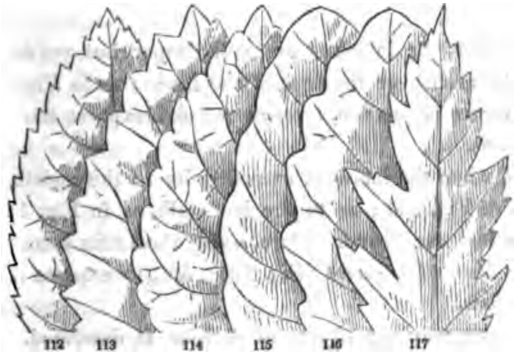


FIG. 112–117. Kinds of margin of leaves.

Crenate, or *scalloped*, when the teeth are broad and rounded; as in Fig. 114, 101.

Repand, *undulate*, or *wavy*, when the margin of the leaf forms a wavy line, bending slightly inwards and outwards in succession; as in Fig. 115.

Sinuate, when the margin is more strongly sinuous, or turned inwards and outwards, as in Fig. 116.

Incised, *cut*, or *jagged*, when the margin is cut into sharp, deep, and irregular teeth or incisions, as in Fig. 117.

157. When leaves are more deeply cut, and with a definite number of incisions, they are said, as a general term, to be *lobed;* the parts being called *lobes*. Their number is expressed by the phrase *two-lobed*, *three-lobed*, *five-lobed*, *many-lobed*, &c., as the case may be. When the depth and character of the lobing needs to be more particularly specified, — as is often the case, — the following terms are employed, viz.:

Lobed, when the incisions do not extend deeper than about half-way between the margin and the centre of the blade, if so far, and are more or less rounded; as in the leaves of the Post-Oak, Fig. 118, and the Hepatica, Fig. 122.

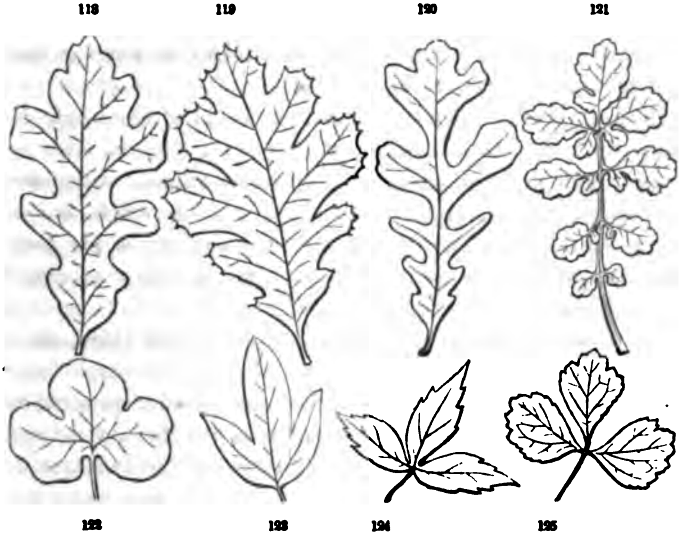
Cleft, when the incisions extend half-way down or more, and especially when they are sharp, as in Fig. 119, 123. And the phrases *two-cleft*, or, in the Latin form, *bifid;* *three-cleft*, or *trifid;* *four-cleft*, or *quadrifid;* *five-cleft*, or *quinquefid*, &c.; or *many-cleft*, in the Latin form *multifid*, — express the number of the *segments*, or portions.

Parted, when the incisions are still deeper, but yet do not quite reach to the midrib or the base of the blade; as in Fig. 120, 124. And the terms *two-parted*, *three-parted*, &c. express the number of such divisions.

Divided, when the incisions extend quite to the midrib, as in the lower part of Fig. 121; or to the leaf-stalk, as in Fig. 125; which makes the leaf compound. Here, using the Latin form, the leaf is said to be *bisected*, *trisected* (Fig. 125), &c., to express the number of the divisions.

158. In this way the *degree* of division is described. We may likewise express the *mode* of division. The notches or incisions, being places where the green pulp of the blade has not wholly filled up the framework, correspond with the veining; as we perceive on comparing the figures 118 to 121 with figures 122 to 125. The

upper row of figures consists of *feather-veined*, or, in Latin form, *pinnately-veined* leaves (145); the lower row, of *radiate-veined* or *palmately-veined* leaves (146).



159. In the upper row the incisions all point towards the midrib, from which the main veins arise, the incisions (or *sinuses*) being between the main veins. That is, being *pinnately* veined, such leaves are *pinnately lobed* (Fig. 118), *pinnately cleft*, or *pinnatifid* (Fig. 119), *pinnately parted* (Fig. 120), or *pinnately divided* (Fig. 121), according to the depth of the incisions, as just defined.

160. In the lower row of figures, as the main veins or ribs all proceed from the base of the blade or the summit of the leaf-stalk, so the incisions all point in that direction. That is, *palmately*-veined leaves are *palmately lobed* (Fig. 122), *palmately cleft* (Fig. 123), *palmately parted* (Fig. 124), or *palmately divided* (Fig. 125). Sometimes, instead of palmately, we say *digitately* cleft, &c., which means just the same.

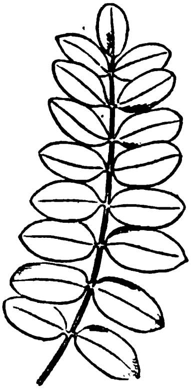
161. To be still more particular, the number of the lobes, &c. may come into the phrase. Thus, Fig. 122 is a *palmately three-lobed;* Fig. 123, a *palmately three-cleft;* Fig. 124, a *palmately three-parted;* Fig. 125, a *palmately three-divided*, or *trisected*, leaf. The

FIG. 118 - 121. Pinnately lobed, cleft, parted, and divided leaves.
FIG. 122 - 125. Palmately or digitately lobed, cleft, parted, and divided leaves.

Sugar-Maple and the Buttonwood (Fig. 50) have *palmately five-lobed leaves;* the Soft White-Maple *palmately five-parted leaves;* and so on. And in the other sort, the Post-Oak has *pinnately seven-* to *nine-lobed leaves;* the Red-Oak commonly has *pinnately seven-* to *nine-cleft leaves,* &c., &c.

162. The divisions, lobes, &c. may themselves be *entire* (without teeth or notches, 156), as in Fig. 118, 122, &c.; or *serrate* (Fig. 124), or otherwise toothed or incised (Fig. 121); or else lobed, cleft, parted, &c.: in the latter cases making *twice pinnatifid, twice palmately* or *pinnately lobed, parted,* or *divided* leaves, &c. From these illustrations, the student will perceive the plan by which the botanist, in two or three words, may describe any one of the almost endlessly diversified shapes of leaves, so as to convey a perfectly clear and definite idea of it.

163. **Compound Leaves.** These, as already stated (155), do not differ in any absolute way from the *divided* form of simple leaves. A compound leaf is one which has its blade in two or more entirely separate parts, each usually with a stalklet of its own: and the stalklet is often *jointed* (or *articulated*) with the main leaf-stalk, just as this is jointed with the stem. When this is the case, there is no doubt that the leaf is compound. But when the pieces have no stalklets, and are not jointed with the main leaf-stalk, the leaf may be considered either as simple and divided, or compound, according to the circumstances.



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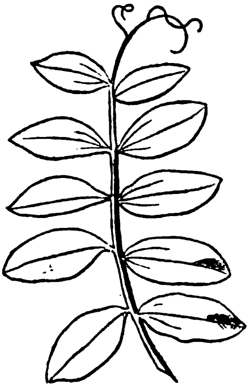

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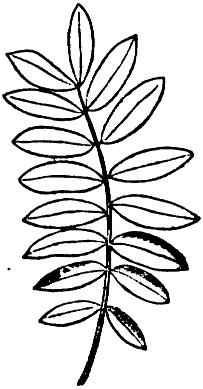

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FIG. 126. Pinnate with an odd leaflet, or odd-pinnate. 127. Pinnate with a tendril. 128. Abruptly pinnate leaf.

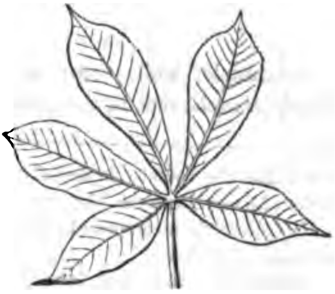
164. The separate pieces or little blades of a compound leaf are called *leaflets.*

165. Compound leaves are of two principal kinds, namely, the *pinnate* and the *palmate ;* answering to the two modes of veining in reticulated leaves (145 – 147), and to the two sorts of lobed or divided leaves (158, 159).

166. *Pinnate* leaves are those in which the leaflets are arranged on the sides of a main leaf-stalk; as in Fig. 126 – 128. They answer to the *feather-veined* (i. e. *pinnately-veined*) simple leaf; as will be seen at once, on comparing Fig. 126 with the figures 118 to 121. The *leaflets* of the former answer to the *lobes* or *divisions* of the latter; and the continuation of the petiole, along which the leaflets are arranged, answers to the midrib of the simple leaf.

167. Three sorts of pinnate leaves are here given. Fig. 126 is *pinnate with an odd or end leaflet,* as in the Common Locust and the Ash. Fig. 127 is *pinnate with a tendril at the end,* in place of the odd leaflet, as in the Vetches and the Pea. Fig. 128 is *abruptly pinnate,* having a pair of leaflets at the end, like the rest of the leaflets; as in the Honey-Locust.

168. *Palmate* (also named *digitate*) leaves are those in which the leaflets are all borne on the very tip of the leaf-stalk, as in the Lupine, the Common Clover (Fig. 136), the Virginia Creeper (Fig. 62), and the Horsechestnut and Buckeye (Fig. 129). They answer to the *radiate-veined* or *palmately-veined* simple leaf; as is seen by comparing Fig. 136 with the figures 122 to 125. That is, the Clover-leaf of three leaflets is the same as a palmately three-ribbed leaf cut into three separate leaflets. And such a simple five-lobed leaf as that of the Sugar-Maple, if more cut, so as to separate the parts, would produce a palmate leaf of five leaflets, like that of the Horsechestnut or Buckeye (Fig. 129).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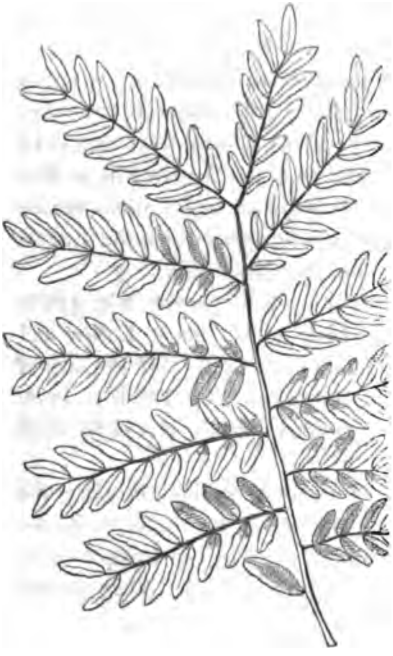
169. Either sort of compound leaf may have any number of leaflets; though palmate leaves cannot well have a great many, since they are all crowded together on the end of the main leaf-stalk.

FIG. 129. Palmate leaf of five leaflets, of the Sweet Buckeye.

Some Lupines have nine or eleven; the Horsechestnut has seven, the Sweet Buckeye more commonly five, the Clover three. A pinnate leaf often has only seven or five leaflets, as in the Wild Bean or Groundnut; and in the Common Bean it has only three; in some rarer cases only two; in the Orange and Lemon only one! The joint at the place where the leaflet is united with the petiole alone distinguishes this last case from a simple leaf.*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170. The leaflets of a compound leaf may be either *entire* (as in Fig. 126 – 128), or *serrate*, or lobed, cleft, parted, &c.: in fact, they may present all the variations of simple leaves, and the same terms equally apply to them.

171. When this division is carried so far as to separate what would be one leaflet into two, three, or several, the leaf becomes *doubly* or *twice compound*, either *pinnately* or *palmately*, as the case may be. For example, while some of the leaves of the Honey-Locust are *simply pinnate*, that is, *once pinnate*, as in Fig. 128, the greater part

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* When the botanist, in describing leaves, wishes to express the number of leaflets, he may use terms like these:—

Unifoliolate, for a compound leaf of a single leaflet; from the Latin *unum*, one, and *foliolum*, leaflet.

Bifoliolate, of two leaflets, from the Latin *bis*, twice, and *foliolum*, leaflet.

Trifoliolate (or *ternate*), of three leaflets, as the Clover; and so on.

When he would express in one phrase both the number of leaflets and the way the leaf is compound, he writes:—

Palmately bifoliolate, trifoliolate, plurifoliolate (of several leaflets), &c., or else

Pinnately bi-, tri-, quadri-, or *pluri-foliolate* (that is, of two, three, four, five, or several leaflets), as the case may be.

FIG. 130. A twice-pinnate (abruptly) leaf of the Honey-Locust.

are *bipinnate*, i. e. *twice pinnate*, as in Fig. 130. If these leaflets were again divided in the same way, the leaf would become *thrice pinnate*, or *tripinnate*, as in many Acacias. The first divisions are called *pinnæ;* the others, *pinnules;* and the last, or little blades, *leaflets*.

172. So the palmate leaf, if again compounded in the same way, becomes *twice palmate*, or, as we say when the divisions are in threes, *twice ternate* (in Latin form *biternate*); if a third time compounded, *thrice ternate* or *triternate*. But if the division goes still further, or if the degree is variable, we simply say that the leaf is *decompound;* either palmately or pinnately so, as the case may be. Thus, Fig. 138 represents a four times ternately compound, in other words a *ternately decompound*, leaf of our common Meadow Rue.

173. So exceedingly various are the kinds and shapes of leaves, that we have not yet exhausted the subject. We have, however, mentioned the principal terms used in describing them. Many others will be found in the glossary at the end of the volume. Some peculiar sorts of leaves remain to be noticed, which the student might not well understand without some explanation; such as

174. **Perfoliate Leaves.** A common and simple case of this sort is found in two species of Uvularia or Bellwort, where the stem appears to run through the blade of the leaf, near one end. If we look at this plant in summer, after all the leaves are formed, we may see the meaning of this at a glance. For then we often find upon the same stem such a series of leaves as is given in Fig. 131: the lower leaves are *perfoliate*, those next above less so; then some (the fourth and fifth) with merely a heart-shaped clasping base, and finally one that is merely *sessile*. The leaf, we perceive, becomes perfoliate by the union of the edges of the base with each other around the stem; just as the shield-shaped leaf, Fig. 102, comes from the union of the edges of the base of such a leaf as Fig. 101. Of the same sort are the upper leaves of most of

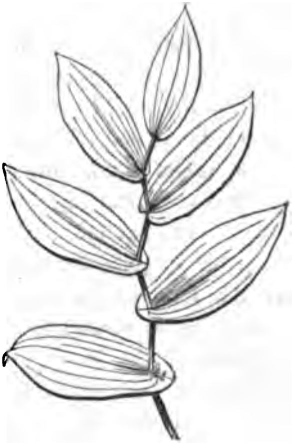
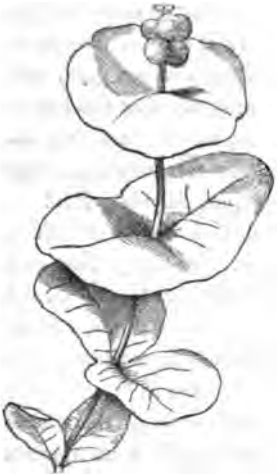


FIG. 131. Leaves of Uvularia (Bellwort); the lower ones perfoliate, the others merely clasping, or the uppermost only sessile.

the true Honeysuckles (Fig. 132): but here it is a pair of opposite leaves, with their contiguous broad bases grown together, which makes what seems to be one round leaf, with the stem running through its centre. This is seen to be the case, by comparing together the upper and the lowest leaves of the same branch. Leaves of this sort are said to be *connate-perfoliate*.

175. **Equitant Leaves.** While ordinary leaves spread horizontally, and present one face to the sky and the other to the earth, there are some that present their tip to the sky, and their faces right and left to the horizon. Among these are the *equitant* leaves of the Iris or Flower-de-Luce. On careful inspection we shall find that each leaf was formed *folded together lengthwise*, so that what would be the upper surface is within, and all grown together, except next the bottom, where each leaf covers the next younger one. It was from their straddling over each other, like a man on horseback (as is seen in the cross-section, Fig. 134), that Linnæus, with his lively fancy, called these *equitant* leaves.



176. **Leaves with no distinction of Petiole and Blade.** The leaves of Iris just mentioned show one form of this. The flat but narrow leaves of Jonquils, Daffodils, and the like, are other instances. *Needle-shaped* leaves, like those of the Pine (Fig. 140), Larch (Fig. 139), and Spruce, and the *awl-shaped* as well as the *scale-shaped* leaves of Junipers, Red Ce-

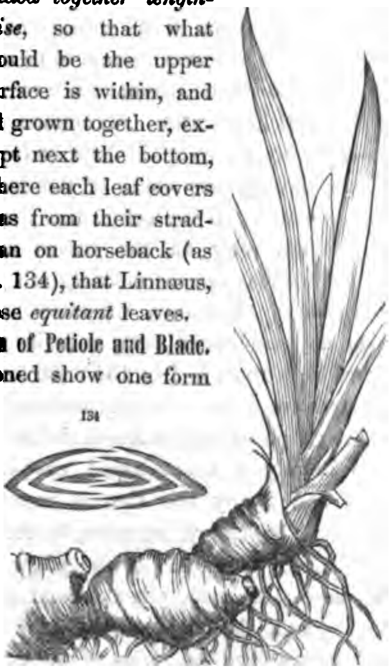
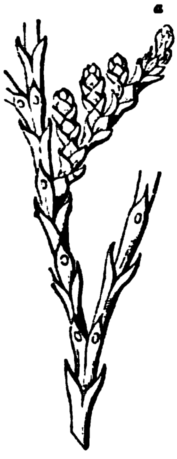


FIG. 132. Branch of a Yellow Honeysuckle, with connate-perfoliate leaves.

FIG. 133. Rootstock and equitant leaves of Iris. 134. A section across the cluster of leaves at the bottom.

dar, and Arbor-Vitæ (Fig. 135), are different examples. These last are leaves serving for foliage, but having as little spread of surface as possible. They make up for this, however, by their immense numbers.



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177. Sometimes the *petiole* expands and flattens, and takes the place of the blade; as in numerous New Holland Acacias, some of which are now common in greenhouses. Such counterfeit blades are called *phyllodia*, — meaning leaf-like bodies. They may be known from true blades by their standing edgewise, their margins being directed upwards and downwards; while in true blades the faces look upwards and downwards; excepting in equitant leaves, as already explained, and in those which are turned edgewise by a twist, such as those of the Callistemon or Bottle-brush Flower of our greenhouses, and other Dry Myrtles of New Holland, &c.

178. **Stipules**, the pair of appendages which is found at the base of the petiole in many leaves (133), should also be considered in respect to their very varied forms and appearances. More commonly they appear like little blades, on each side of the leaf-stalk, as in the Quince (Fig. 83), and more strikingly in the Hawthorn and in the Pea. Here they remain as long as the rest of the leaf, and serve for the same purpose as the blade. Very commonly they serve for bud-scales, and fall off when the leaves expand, as in the Fig-tree, and the Magnolia (where they are large and conspicuous), or soon

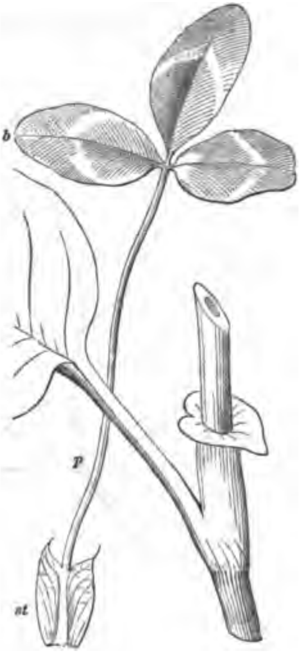

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FIG. 135. Twig of Arbor-Vitæ, with its two sorts of leaves: viz. some awl-shaped, the others scale-like; the latter on the branchlets, *a*.

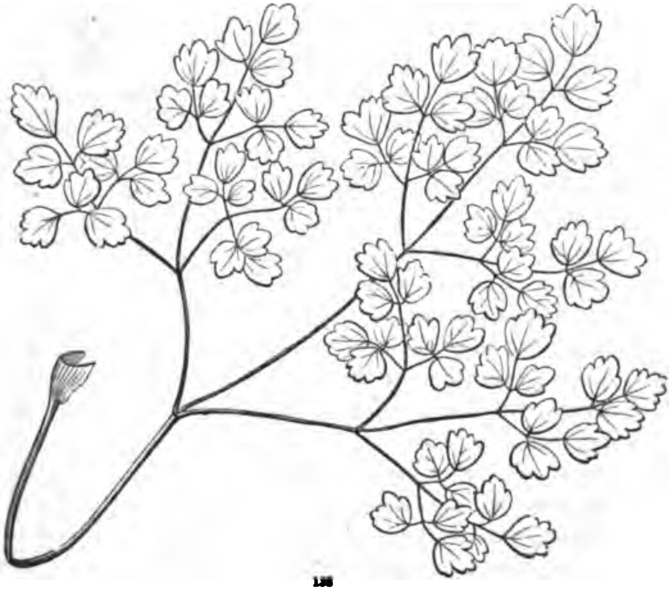
FIG. 136. Leaf of Red Clover: *st*, stipules, adhering to the base of *p*, the petiole: *b*, blade of three leaflets.

FIG. 137. Part of stem and leaf of Prince's-Feather (Polygonum orientale) with the united sheathing stipules forming a sheath.

afterwards, as in the Tulip-tree. In the Pea the stipules make a very conspicuous part of the leaf; while in the Bean they are quite small; and in the Locust they are reduced to bristles or prickles. Sometimes the stipules are separate and distinct (Fig. 83): often they are united with the base of the leaf-stalk, as in the Rose and the Clover (Fig. 136): and sometimes they grow together by both margins, so as to form a sheath around the stem, above the leaf, as in the Buttonwood, the Dock, and almost all the plants of the Polygonum Family (Fig. 137).

179. The sheaths of Grasses bear the blade on their summit, and therefore represent a form of the petiole. The small and thin appendage which is commonly found at the top of the sheath (called a *ligule*) here answers to the stipule.

FIG. 138. Ternately-decompound leaf of Meadow Rue (Thalictrum Cornuti).



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LESSON X.

THE ARRANGEMENT OF LEAVES.

180. UNDER this head we may consider, — 1. the arrangement of leaves on the stem, or what is sometimes called PHYLLOTAXY (from two Greek words meaning *leaf-order*); and 2. the ways in which they are packed together in the bud, or their VERNATION (the word meaning their spring state).

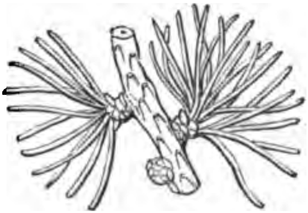
181. **Phyllotaxy.** As already explained (48, 49), leaves are arranged on the stem in two principal ways. They are either

Alternate (Fig. 131, 143), that is, one after another, only a single leaf arising from each node or joint of the stem; or

Opposite (Fig. 147), when there is a pair of leaves on each joint of the stem; one of the two leaves being in this case always situated exactly on the opposite side of the stem from the other. A third, but uncommon arrangement, may be added; namely, the

Whorled, or *verticillate* (Fig. 148), when there are three or more leaves in a circle (*whorl* or *verticil*) on one joint of stem. But this is only a variation of the opposite mode; or rather the latter arrangement is the same as the whorled, with the number of the leaves reduced to two in each whorl.

182. Only one leaf is ever produced from the same point. When two are borne on the same joint, they are always on opposite sides of the stem, that is, are separated by half the circumference; when in whorls of three, four, five, or any other number, they are equally distributed around the joint of stem, at a distance of one third, one fourth, or one fifth of the circumference from each other, according to their number. So they always have the greatest possible divergence from each other. Two or more leaves belonging to the same joint of stem never stand side by side, or one above the other, in a cluster.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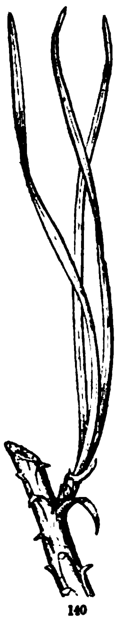
183. What are called *clustered* or *fascicled* leaves, and which

FIG. 139. Clustered or fascicled leaves of the Larch.

appear to be so, are always the leaves of a whole branch which remains so very short that they are all crowded together in a bundle or rosette; as in the spring leaves of the Barberry and of the Larch (Fig. 139). In these cases an examination shows them to be nothing else than alternate leaves, very much crowded on a short spur; and some of these spurs are seen in the course of the season to lengthen into ordinary shoots with scattered alternate leaves. So, likewise, each cluster of two or three needle-shaped leaves in Pitch Pines (as in Fig. 140), or of five leaves in White Pine, answers to a similar, extremely short branch, springing from the axil of a thin and slender scale, which represents a leaf of the main shoot. For Pines produce two kinds of leaves; — 1. primary, the proper leaves of the shoots, not as foliage, but in the shape of delicate scales in spring, which soon fall away; and 2. secondary, the *fascicled* leaves, from buds in the axils of the former, and these form the actual foliage.

184. **Spiral Arrangement of Leaves.** If we examine any alternate-leaved stem, we shall find that the leaves are placed upon it in symmetrical order, and in a way perfectly uniform for each species, but different in different plants. If we draw a line from the *insertion* (i. e. the point of attachment) of one leaf to that of the next, and so on, this line will wind spirally around the stem as it rises, and in the same species will always have just the same number of leaves upon it for each turn round the stem. That is, any two successive leaves will always be separated from each other by just an equal portion of the circumference of the stem. The distance in *height* between any two leaves may vary greatly, even on the same shoot, for that depends upon the length of the *internodes* or spaces between each leaf; but the distance as measured around the circumference (in other words, the *angular divergence*, or angle formed by any two successive leaves) is uniformly the same.



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185. The greatest possible divergence is, of course, where the second leaf stands on exactly the opposite side of the stem from the first, the third on the side opposite the second, and therefore over the

FIG. 140. Piece of a branchlet of Pitch Pine, with three leaves in a fascicle or bundle, in the axil of a thin scale which answers to a primary leaf. The bundle is surrounded at the base by a short sheath, formed of the delicate scales of the axillary bud.

first, and the fourth over the second. This brings all the leaves into two ranks, one on one side of the stem and one on the other; and is therefore called the *two-ranked* arrangement. It occurs in all Grasses,—in Indian Corn, for instance; also in the Spiderwort, the Bellwort (Fig. 131) and Iris (Fig. 132), in the Basswood or Lime-tree, &c. This is the simplest of all arrangements.

186. Next to this is the *three-ranked* arrangement, such as we see in Sedges, and in the Veratrum or White Hellebore. The plan of it is shown on a Sedge in Fig. 141, and in a diagram or cross-section underneath, in Fig. 142. Here the second leaf is placed one third of the way round the stem, the third leaf two thirds of the way round, the fourth leaf accordingly directly over the first, the fifth over the second, and so on. That is, three leaves occur in each turn round the stem, and they are separated from each other by one third of the circumference.

187. The next and one of the most common is the *five-ranked* arrangement; which is seen in the Apple (Fig. 143), Cherry, Poplar, and the greater part of our trees and shrubs. In this case the line traced from leaf to leaf will pass twice round the stem before it reaches a leaf situated directly over any below (Fig. 144). Here the sixth leaf is over the first; the leaves stand in five perpendicular ranks, equally distant from each other; and the distance between any two successive leaves is just two fifths of the circumference of the stem.

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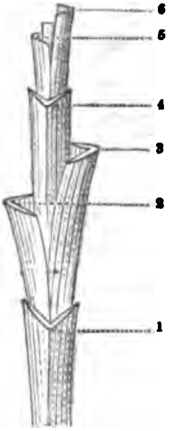

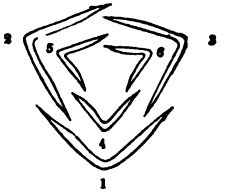

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188. The five-ranked arrangement is expressed by the fraction $\frac{2}{5}$. This fraction denotes the divergence of the successive leaves, i. e. the angle they form with each other: the numerator also expresses the number of turns made round the stem by the spiral line in completing one cycle or set of leaves, namely 2; and the denominator gives the number of leaves in each cycle, or the number of perpendicular

FIG. 141. Piece of the stalk of a Sedge, with the leaves cut away, leaving their bases; the leaves are numbered in order, from 1 to 6. 142. Diagram or cross-section of the same, all in one plane; the leaves similarly numbered.

ranks, namely 5. In the same way the fraction $\frac{1}{2}$ stands for the two-ranked mode, and $\frac{1}{3}$ for the three-ranked: and so these different sorts are expressed by the series of fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$. And the other cases known follow in the same numerical progression.

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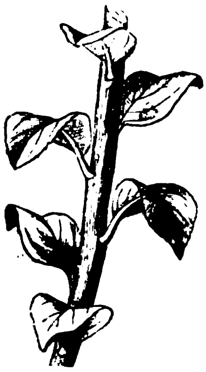

189. The next is the *eight-ranked* arrangement, where the ninth leaf stands over the first, and three turns are made around the stem to reach it; so it is expressed by the fraction $\frac{3}{8}$. This is seen in the Holly, and in the common Plantain. Then comes the *thirteen-ranked* arrangement, in which the fourteenth leaf is over the first, after five turns around the stem. Of this we have a good example in the common Houseleek (Fig. 146).

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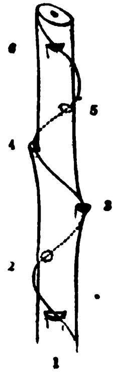

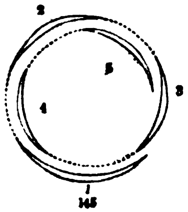

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190. The series so far, then, is $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{8}$, $\frac{5}{13}$; the numerator and the denominator of each fraction being those of the two next preceding ones added together. At this rate the next higher should be $\frac{8}{21}$, then $\frac{13}{34}$, and so on; and in fact just such cases are met with, and (commonly) no others. These higher sorts are found in the Pine Family, both in the leaves and the cones (Fig. 324), and in many other plants with small and crowded leaves. But the number of the ranks, or of leaves in each cycle, can here rarely be made out by direct inspection: they may be ascertained, however, by certain simple mathematical computations, which are rather too technical for these Lessons.

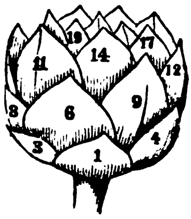

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FIG. 143. Shoot with its leaves 5-ranked, the sixth leaf over the first; as in the Apple-tree.

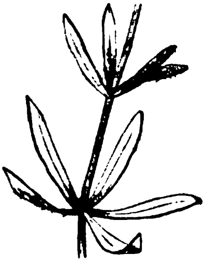
FIG. 144. Diagram of this arrangement, with a spiral line drawn from the attachment of one leaf to the next, and so on; the parts on the side turned from the eye are fainter.

FIG. 145. A ground-plan of the same; the section of the leaves similarly numbered; a dotted line drawn from the edge of one leaf to that of the next completes the spiral.

FIG. 146. A young plant of the Houseleek, with the leaves (not yet expanded) numbered, and exhibiting the 13-ranked arrangement.

191. The arrangement of opposite leaves (181) is usually very simple. The second pair is placed over the intervals of the first; the third over the intervals of the second, and so on (Fig. 147); the successive pairs thus crossing each other, — commonly at right angles, so as to make four upright rows. And *whorled* leaves (Fig. 148) follow a similar plan.

192. So the place of every leaf on every plant is fixed beforehand by unerring mathematical rule. As the stem grows on, leaf after leaf appears exactly in its predestined place, producing a perfect symmetry; — a symmetry which manifests itself not in one single monotonous pattern for all plants, but in a definite number of forms exhibited by different species, and arithmetically expressed by the series of fractions, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{5}$, $\frac{3}{8}$, $\frac{5}{13}$, $\frac{8}{21}$, &c., according as the formative energy in its spiral course up the developing stem lays down at corresponding intervals 2, 3, 5, 8, 13, or 21 ranks of alternate leaves.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193. **Vernation**, sometimes called *Præfoliation*, relates to the way in which leaves are disposed in the bud (180). It comprises two things; — 1st, the way in which each separate leaf is folded, coiled, or packed up in the bud; and 2d, the arrangement of the leaves in the bud with respect to one another. The latter of course depends very much upon the phyllotaxy, i. e. the position and order of the leaves upon the stem. The same terms are used for it as for the arrangement of the leaves of the flower in the flower-bud: so we may pass them by until we come to treat of the flower in this respect.

194. As to each leaf separately, it is sometimes *straight* and open in vernation, but more commonly it is either *bent*, *folded*, or *rolled up*. When the upper part is bent down upon the lower, as the young blade in the Tulip-tree is bent upon the leafstalk, it is said to be *inflexed* or *reclined* in vernation. When folded

FIG. 147. Opposite leaves of the Spindle-tree or Burning-bush.
FIG. 148. Whorled or verticillate leaves of Galium or Bedstraw.

by the midrib so that the two halves are placed face to face, it is *conduplicate* (Fig. 149), as in the Magnolia, the Cherry, and the Oak: when folded back and forth like the plaits of a fan, it is *plicate* or *plaited* (Fig. 150), as in the Maple and Currant. If rolled, it may be so either from the tip downwards, as in Ferns and the Sundew (Fig. 154), when in unrolling it resembles the head of a crosier, and is said to be *circinate;* or it may be rolled up parallel with the axis, either from one edge into a coil, when it is *convolute* (Fig. 151), as in the Apricot and Plum, or rolled from both edges towards the midrib; — sometimes inwards, when it is *involute* (Fig. 152), as in the Violet and Water-Lily; sometimes outwards, when it is *revolute* (Fig. 153), in the Rosemary and Azalea. The figures are diagrams, representing sections through the leaf, in the way they were represented by Linnæus.

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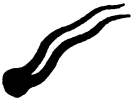

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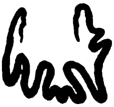

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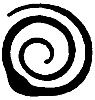

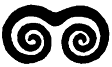

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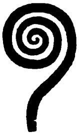

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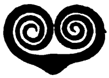

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LESSON XI.

THE ARRANGEMENT OF FLOWERS ON THE STEM, OR INFLORESCENCE.

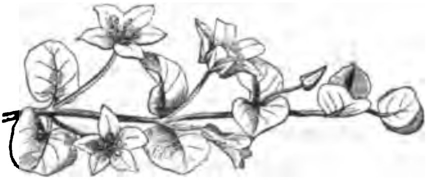
195. THUS far we have been considering the *vegetation* of the plant, and studying those parts, viz. root, stem, and leaves, by which it increases in size and extent, and serves the purpose of its individual life. But after a time each plant produces a different set of organs, — viz. flowers, fruit, and seed, — subservient to a different purpose, that is, the increase in numbers, or the continuance of the

species. The plant reproduces itself in new individuals by seed. Therefore the *seed*, and the *fruit* in which the seed is formed, and the *flower*, from which the fruit results, are named the *Organs of Reproduction* or *Fructification*. These we may examine in succession. We begin, of course, with the flower. And the first thing to consider is the

196. **Inflorescence**, or the mode of flowering, that is, the situation and arrangement of blossoms on the plant. Various as this arrangement may seem to be, all is governed by a simple law, which is easily understood. As the position of every leaf is fixed beforehand by a mathematical law which prescribes where it shall stand (192), so is that of every blossom; — and by the same law in both cases. For flowers are buds, developed in a particular way; and flower-buds occupy the position of leaf-buds, and no other As leaf-buds are either terminal (at the summit of a stem or branch, 42), or axillary (in the axil of a leaf, 43), so likewise

197. Flowers are either *terminal* or *axillary*. In blossoming as in vegetation we have only buds terminating (i. e. on the summit of) stems or branches, and buds from the axils of leaves. But while the same plant commonly produces both kinds of leaf-buds, it rarely bears flowers in both situations. These are usually either all axillary or all terminal; — giving rise to two classes of inflorescence, viz. the *determinate* and the *indeterminate.*

198. **Indeterminate Inflorescence** is that where the flowers all arise from axillary buds; as in Fig. 155, 156, 157, &c.; and the reason why it is called indeterminate (or *indefinite*) is, that while the axillary buds give rise to flowers, the terminal bud goes on to grow, and continues the stem indefinitely.

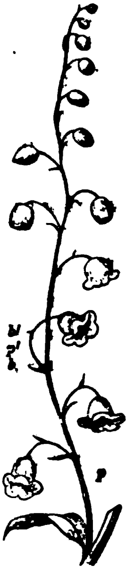


199. Where the flowers arise, as in Fig. 155, singly from the axils of the ordinary leaves of the plant, they do not form flower-clusters, but are *axillary* and *solitary.* But when several or many flowers are produced near each other, the accompanying leaves are usually of smaller size, and often of a different shape or character: then they are called *bracts;* and the flowers thus brought together

FIG. 155. Moneywort (Lysimachia nummularia) of the gardens, with axillary flowers.

form one cluster or inflorescence. The sorts of inflorescence of the indeterminate class which have received separate names are chiefly the following: viz. the *Raceme*, the *Corymb*, the *Umbel*, the *Spike*, the *Head*, the *Spadix*, the *Catkin*, and the *Panicle*.

200. Before illustrating these, one or two terms, of common occurrence, may be defined. A flower (or other body) which has no stalk to support it, but which sits directly on the stem or axis it proceeds from, is said to be *sessile*. If it has a stalk, this is called its *peduncle*. If the whole flower-cluster is raised on a stalk, this is called the peduncle, or the *common peduncle* (Fig. 156, *p*); and the stalk of each particular flower, if it have any, is called the *pedicel* or *partial peduncle* (*p'*). The portion of the general stalk along which flowers are disposed is called the *axis of inflorescence*, or, when covered with sessile flowers, the *rhachis* (back-bone), and sometimes the *receptacle*. The leaves of a flower-cluster generally are termed *bracts*. But when we wish particularly to distinguish them, those on the peduncle, or main axis, and which have a flower in their axil, take the name of *bracts* (Fig. 156, *b*); and those on the pedicels or partial flower-stalks, if any, that of *bractlets* (Fig. 156, *b'*).



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201. A **Raceme** (Fig. 156, 157) is that form of flower-cluster in which the flowers, each on their own foot-stalk or pedicel, are arranged along a common stalk or axis of inflorescence; as in the Lily of the Valley, Currant, Choke-Cherry, Barberry, &c. Each flower comes from the axil of a small leaf, or bract, which, however, is often so small that it might escape notice, and which sometimes (as in the Mustard Family) disappears altogether. The lowest blossoms of a raceme are of course the oldest, and therefore open first, and the order of blossoming is *ascending*, from the bottom to the top. The summit, never being stopped by a terminal flower, may go on to grow, and often does so (as in the common Shepherd's Purse), producing lateral flowers one after another the whole summer long.

202. All the various kinds of flower-clusters pass one into another

FIG. 156. A Raceme, with a general peduncle (*p*), pedicels (*p'*), bracts (*b*), and bractlets (*b'*).

by intermediate gradations of every sort. For instance, if we lengthen the lower pedicels of a raceme, and keep the main axis rather short, it is converted into

203. **A Corymb** (Fig. 158). This is the same as a raceme, except that it is flat and broad, either convex, or level-topped, as in the Hawthorn, owing to the lengthening of the lower pedicels while the uppermost remain shorter.

204. The main axis of a corymb is short, at least in comparison with the lower pedicels. Only suppose it to be so much contracted that the bracts are all brought into a cluster or circle, and the corymb becomes

205. **An Umbel** (Fig. 159), — as in the Milkweed and Primrose, — a sort of flower-cluster where the pedicels all spring apparently from the same point, from the top of the peduncle, so as to resemble, when spreading, the rays of an umbrella, whence the name. Here the pedicels are sometimes called the *rays* of the umbel. And the bracts, when brought in this way into a cluster or circle, form what is called an *involucre.*

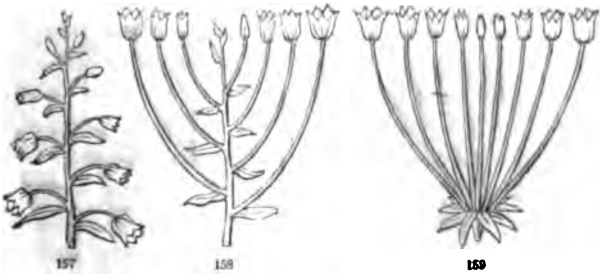
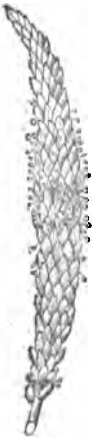


FIG. 157. A raceme. 158. A corymb. 159. An umbel.

206. For the same reason that the order of blossoming in a raceme is ascending (201), in the corymb and umbel it is *centripetal,* that is, it proceeds from the margin or circumference regularly towards the centre; the lower flowers of the former answering to the outer ones of the latter. Indeterminate inflorescence, therefore, is said to be centripetal in evolution. And by having this order of blossoming, all the sorts may be distinguished from those of the other, or the determinate class. In all the foregoing cases the flowers are raised on pedicels. These, however, are very short in many instances, or are wanting altogether; when the flowers are *sessile* (200). They are so in



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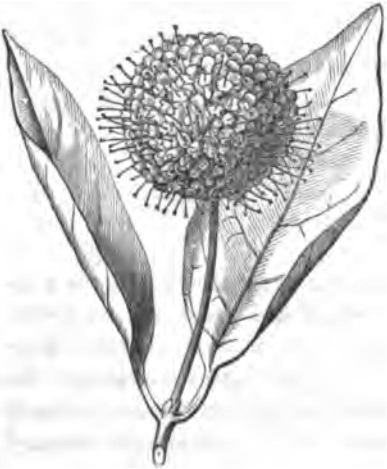
207. **The Spike.** This is a flower-cluster with a more or less lengthened axis, along which the flowers are sessile or nearly so; as in the Mullein and the Plantain (Fig. 160). It is just the same as a raceme, therefore, without any pedicels to the flowers.

208. **The Head** is a round or roundish cluster of flowers which are sessile on a very short axis or receptacle, as in the Button-ball, Button-bush (Fig. 161), and Red Clover. It is just what a spike would become if its axis were shortened; or an umbel, if its pedicels were all shortened until the flowers became sessile or apparently so. The head of the Button-bush (Fig. 161) is naked; but that of the Thistle, of the Dandelion, the Cichory (Fig. 221), and the like, is surrounded by empty bracts, which form an *involucre.* Two particular forms of the spike and the head have received particular names, namely, the *Spadix* and the *Catkin.*

209. **A Spadix** is nothing but a fleshy spike or head, with small and often imperfect flowers, as in the Calla, the Indian Turnip (Fig. 162), Sweet Flag, &c. It is commonly covered by a peculiar enveloping leaf, called a *spathe.*



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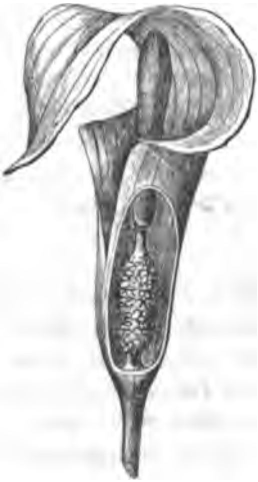

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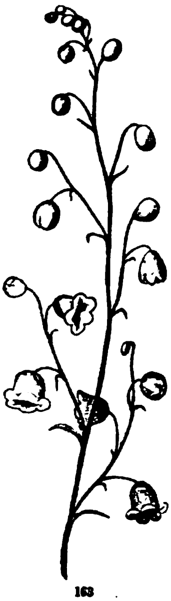
FIG. 160. Spike of the common Plantain or Ribwort.
FIG. 161. Head of the Button-bush (Cephalanthus).
FIG. 162. Spadix and spathe of the Indian Turnip; the latter cut through below.

210. **A Catkin or Ament** is the name given to the scaly sort of spike of the Birch and Alder, the Willow and Poplar, and one sort of flower-clusters of the Oak, Hickory, and the like; — on which account these are called *Amentaceous* trees.

211. Sometimes these forms of flower-clusters become *compound*. For example, the stalks which, in the simple umbel such as has been described (Fig. 159), are the pedicels of single flowers, may themselves branch in the same way at the top, and so each become the support of a smaller umbel; as is the case in the Parsnip, Caraway, and almost the whole of the great family of what are called *Umbelliferous* (i. e. umbel-bearing) plants. Here the whole is termed a *compound umbel;* and the smaller or *partial* umbels take the name in English of *umbellets*. The *general involucre*, at the base of the main umbel, keeps that name; while that at the base of each umbellet is termed a *partial involucre* or an *involucel*.

212. So a corymb (Fig. 158) with its separate stalks branching again, and bearing smaller clusters of the same sort, is a *compound corymb;* of which the Mountain Ash is a good example. A raceme where what would be the pedicels of single flowers become stalks, along which flowers are disposed on their own pedicels, forms a *compound raceme*, as in the Goat's-beard and the False Spikenard. But when what would have been a raceme or a corymb branches irregularly into an open and more or less compound flower-cluster, we have what is called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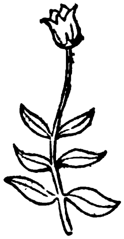
213. **A Panicle** (Fig. 163); as in the Oat and in most common Grasses. Such a raceme as that of the diagram, Fig. 156, would be changed into a panicle like Fig. 163, by the production of a flower from the axil of each of the bractlets *b'*.

214. **A Thyrsus** is a compact panicle of a pyramidal or oblong shape; such as a bunch of grapes, or the cluster of the Lilac or Horsechestnut.

215. **Determinate Inflorescence** is that in which the flowers are from terminal buds. The simplest case is where a stem bears a solitary, terminal flower, as in Fig. 163*. This stops the growth of

FIG. 163. A Panicle.

the stem; for its terminal bud, being changed into a blossom, can no more lengthen in the manner of a leaf-bud. Any further growth must be from axillary buds developing into branches. If such branches are leafy shoots, at length terminated by single blossoms, the inflorescence still consists of solitary flowers at the summit of the stem and branches. But if the flowering branches bear only bracts in place of ordinary leaves, the result is the kind of flower-cluster called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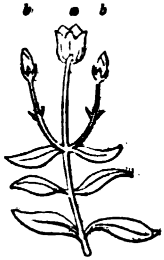

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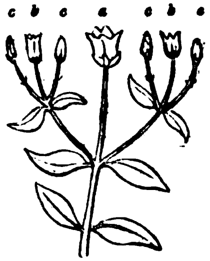

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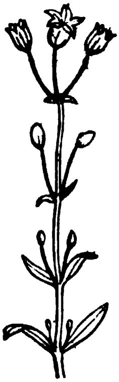
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216. **A Cyme.** This is commonly a flat-topped or convex flower-cluster, like a corymb, only the blossoms are from terminal buds. Fig. 164 illustrates the simplest cyme in a plant with opposite leaves, namely, with three flowers. The middle flower, *a*, terminates the stem; the two others, *b b*, terminate short branches, one from the axil of each of the uppermost leaves; and being later than the middle one, the flowering proceeds from the centre outwards, or is *centrifugal;* — just the opposite of the indeterminate mode, or that where all the flower-buds are axillary. If flowering branches appear from the axils below, the lower ones are the later, so that the order of blossoming continues *centrifugal* or *descending* (which is the same thing), as in Fig. 166, making a sort of reversed raceme; — a kind of cluster which is to the true raceme just what the flat cyme is to the corymb.

217. Wherever there are bracts or leaves, buds may be produced from their axils and appear as flowers. Fig. 165 represents the case where the branches, *b b*, of Fig. 164, each with a pair of small

FIG. 163 *a*. Diagram of an opposite-leaved plant, with a single terminal flower. 164. Same, with a cyme of three flowers; *a*, the first flower, of the main axis; *b b*, those of branches. 165. Same, with flowers of the third order, *c c*. 166. Same, with flowers only of the second order from all the axils; the central or uppermost opening first, and so on downwards.

leaves or bracts about their middle, have branched again, and produced the branchlets and flowers *c c*, on each side. It is the continued repetition of this which forms the full or compound cyme, such as that of the Laurustinus, Hobblebush, Dogwood, and Hydrangea (Fig. 167).

218. **A Fascicle**, like that of the Sweet-William and Lychnis of the gardens, is only a cyme with the flowers much crowded, as it were, into a bundle.

219. **A Glomerule** is a cyme still more compacted, so as to form a sort of head. It may be known from a true head by the flowers not expanding centripetally, that is, not from the circumference towards the centre, or from the bottom to the top.

220. The illustrations of determinate or *cymose* inflorescence have been taken from plants with opposite leaves, which give rise to the most regular cymes. But the Rose, Cinquefoil, Buttercup, and the like, with alternate leaves, furnish equally good examples of this class of flower-clusters.

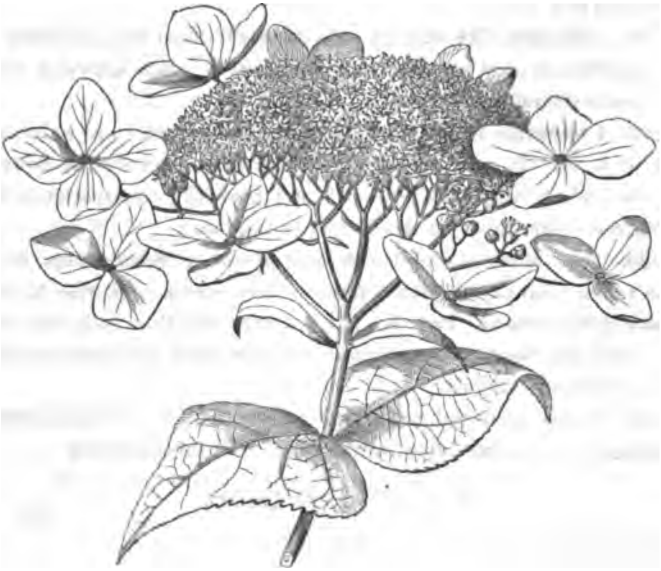
221. It may be useful to the student to exhibit the principal sorts of inflorescence in one view, in the manner of the following

Analysis of Flower-Clusters.

I. INDETERMINATE OR CENTRIPETAL. (198.)		
Simple; and with the		
Flowers borne on pedicels,		
Along the sides of a lengthened axis,	RACEME,	201.
Along a short axis; lower pedicels lengthened,	CORYMB,	203.
Clustered on an extremely short axis,	UMBEL,	205.
Flowers sessile, without pedicels (206),		
Along an elongated axis,	SPIKE,	207.
On a very short axis,	HEAD,	208.
with their varieties, the SPADIX, 209, and	CATKIN,	210.
Branching irregularly,	PANICLE,	213.
with its variety, the	THYRSUS,	214.
II. DETERMINATE OR CENTRIFUGAL. (215.)		
Open, mostly flat-topped or convex,	CYME,	216.
Contracted into a bundle,	FASCICLE,	218.
Contracted into a sort of head,	GLOMERULE,	219.

222. The numbers refer to the paragraphs of this Lesson. The various sorts run together by endless gradations in different plants. The botanist merely designates the leading kinds by particular names. Even the two classes of inflorescence are often found combined in the same plant. For instance, in the whole Mint Family,

the flower-clusters are centrifugal, that is, are cymes or fascicles; but they are themselves commonly disposed in spikes or racemes, which are centripetal, or develop in succession from below upwards.



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LESSON XII.

THE FLOWER: ITS PARTS OR ORGANS.

223. HAVING considered, in the last Lesson, the arrangement of flowers on the stem, or the places from which they arise, we now direct our attention to the flower itself.

224. **Nature and Use of the Flower.** The object of the flower is the production of seed. The flower consists of all those parts, or *organs*, which are subservient to this end. Some of these parts are necessary to the production of seed. Others serve merely to protect or support the more essential parts.

FIG. 167. Cyme of the Wild Hydrangea (with neutral flowers in the border).

225. **The Organs of the Flower** are therefore of two kinds; namely, first, the *protecting organs*, or *leaves of the flower*, — also called the *floral envelopes*, — and, second, the *essential organs*. The latter are situated within or a little above the former, and are enclosed by them in the bud.

226. **The Floral Envelopes** in a complete flower are double; that is, they consist of two whorls (181), or circles of leaves, one above or within the other. The outer set forms the *Calyx;* this more commonly consists of green or greenish leaves, but not always. The inner set, usually of a delicate texture, and of some other color than green, and in most cases forming the most showy part of the blossom, is the *Corolla*.

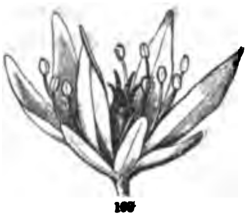
227. The floral envelopes, taken together, are sometimes called the *Perianth*. This name is not much used, however, except in cases where they form only one set, at least in appearance, as in the Lily, or where, for some other reason, the limits between the calyx and the corolla are not easily made out.

228. Each leaf or separate piece of the corolla is called a *Petal;* each leaf of the calyx is called a *Sepal*. The sepals and the petals — or, in other words, the leaves of the blossom — serve to protect, support, or nourish the parts within. They do not themselves make a perfect flower.

229. Some plants, however, naturally produce, besides their perfect flowers, others which consist only of calyx and corolla (one or both), that is, of leaves. These, destitute as they are of the essential organs, and incapable of producing seed, are called *neutral* flowers. We have an example in the flowers round the margin of the cyme of the Hydrangea (Fig. 167), and of the Cranberry-Tree, or Snowball, in their wild state. By long cultivation in gardens the whole cluster has been changed into showy, but useless, neutral flowers, in these and some other cases. What are called *double flowers*, such as full Roses (Fig. 173), Buttercups, and Camellias, are blossoms which, under the gardener's care, have developed with all their essential organs changed into petals. But such flowers are always in an unnatural or monstrous condition, and are incapable of maturing seed, for want of

230. **The Essential Organs.** These are likewise of two kinds, placed one above or within the other; namely, first, the *Stamens* or fertilizing organs, and, second, the *Pistils*, which are to be fertilized and bear the seeds.

231. Taking them in succession, therefore, beginning from below, or at the outside, we have (Fig. 168, 169), first, the *calyx* or outer circle of leaves, which are individually termed *sepals* (*a*); secondly, the *corolla* or inner circle of delicate leaves, called *petals* (*b*); then a set of *stamens* (*c*); and in the centre one or more pistils (*d*). The end of the flower-stalk, or the short axis, upon which all these parts stand, is called the *Torus* or *Receptacle*.



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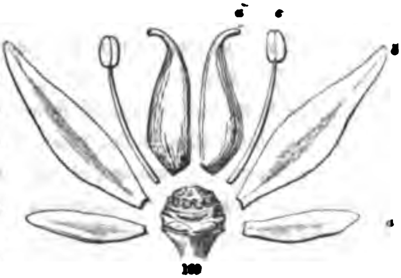
232. We use here for illustration the flower of a species of Stonecrop (Sedum ternatum), — which is a common plant wild in the Middle States, and in gardens almost everywhere, — because, although small, it exhibits all the parts in a perfectly simple and separate state, and so answers for a sort of pattern flower, better than any larger one that is common and well known.



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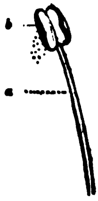
233. A **Stamen** consists of two parts, namely, the *Filament* or stalk (Fig. 170, *a*), and the *Anther* (*b*). The latter is the only essential part. It is a case, commonly with two lobes or cells, each opening lengthwise by a slit, at the proper time, and discharging a powder or dust-like substance, usually of a yellow color. This powder is the *Pollen*, or fertilizing matter, to produce which is the sole office of the stamen.



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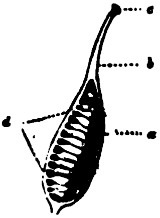

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234. A **Pistil** is distinguished into three parts; namely, — beginning from below, — the *Ovary*, the *Style*, and the *Stigma*. The *Ovary* is the hollow case or young pod (Fig. 171, *a*), containing rudimentary seeds, called *Ovules* (*d*). Fig. 172, representing a pistil like that of

FIG. 168. Flower of a Stonecrop: Sedum ternatum.

FIG. 169. Two parts of each kind of the same flower, displayed and enlarged.

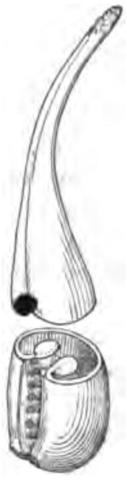
FIG. 170. A stamen: *a*, the filament; *b*, the anther, discharging pollen.

FIG. 171. A pistil divided lengthwise, showing the interior of the ovary, *a*, and its ovules, *d*; *b*, the style; *c*, stigma.

FIG. 172. A pistil, enlarged; the ovary cut across to show the ovules within.

FIG. 173. "Double" Rose; the essential organs all replaced by petals.

Fig. 169, *d*, but on a larger scale, and with the ovary cut across, shows the ovules as they appear in a transverse section. The *style* (Fig. 171, *b*) is the tapering part above, sometimes long and slender, sometimes short, and not rarely altogether wanting, for it is not an essential part, like the two others. The *stigma* (*c*) is the tip or some other portion of the style (or of the top of the ovary when there is no distinct style), consisting of loose tissue, not covered, like the rest of the plant, by a skin or epidermis. It is upon the stigma that the pollen falls; and the result is, that the ovules contained in the ovary are fertilized and become *seeds*, by having an embryo (16) formed in them. To the pistil, therefore, all the other organs of the blossom are in some way or other subservient: the stamens furnish pollen to fertilize its ovules; the corolla and the calyx form coverings which protect the whole.



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234ª. These are all the parts which belong to any flower. But these parts appear under a variety of forms and combinations, some of them greatly disguising their natural appearance. To understand the flower, therefore, under whatever guise it may assume, we must study its plan.

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LESSON XIII.

THE PLAN OF THE FLOWER.

235. THE FLOWER, like every other part of the plant, is formed upon *a plan*, which is essentially the same in all blossoms; and the student should early get a clear idea of the plan of the flower. Then the almost endless varieties which different blossoms present will be at once understood whenever they occur, and will be regarded with a higher interest than their most beautiful forms and richest colors are able to inspire.

236. We have already become familiar with the plan of the vegetation; — with the stem, consisting of joint raised upon joint, each bearing a leaf or a pair of leaves; with the leaves arranged in symmetrical order, every leaf governed by a simple arithmetical law, which fixes beforehand the precise place it is to occupy on the stem; and we have lately learned (in Lesson 11) how the position of each blossom is determined beforehand by that of the leaves; so that the shape of every flower-cluster in a bouquet is given by the same simple mathematical law which arranges the foliage. Let us now contemplate the flower in a similar way. Having just learned what parts it consists of, let us consider the plan upon which it is made, and endeavor to trace this plan through some of the various forms which blossoms exhibit to our view.

237. In order to give at the outset a correct idea of the blossom, we took, in the last Lesson, for the purpose of explaining its parts, a *perfect*, *complete*, *regular*, and *symmetrical* flower, and one nearly as *simple* as such a flower could well be. Such a blossom the botanist regards as

238. **A Typical Flower**, that is, a *pattern flower*, because it well exemplifies the plan upon which all flowers are made, and serves as what is called a *type*, or standard of comparison.

239. Another equally good typical flower (except in a single respect, which will hereafter be mentioned), and one readily to be obtained in the summer, is that of the Flax (Fig. 174). The parts differ in shape from those of the Stonecrop; but the whole plan is evidently just the same in both. Only, while the Stonecrop has ten stamens, or in many flowers eight stamens, — in all cases just twice

as many as there are petals,—the Flax has only five stamens, or just as many as the petals. Such flowers as these are said to be

Perfect, because they are provided with both kinds of essential organs (230), namely, stamens and pistils;

Complete, because they have all the *sorts* of organs which any flower has, namely, both calyx and corolla, as well as stamens and pistils;

Regular, because all the parts of each set are alike in shape and size; and

Symmetrical, because they have an equal number of parts of each sort, or in each set or circle of organs. That is, there are five sepals, five petals, five stamens, or in the Stonecrop ten stamens (namely, two sets of five each), and five pistils.

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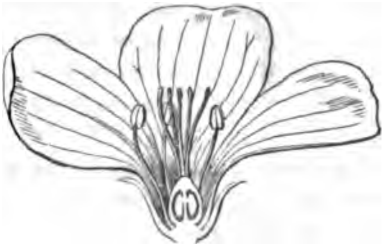
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240. On the other hand, many flowers do not present this perfect symmetry and regularity, or this completeness of parts. Accordingly, we may have

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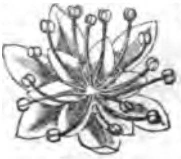

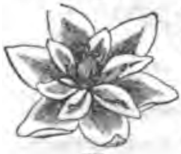
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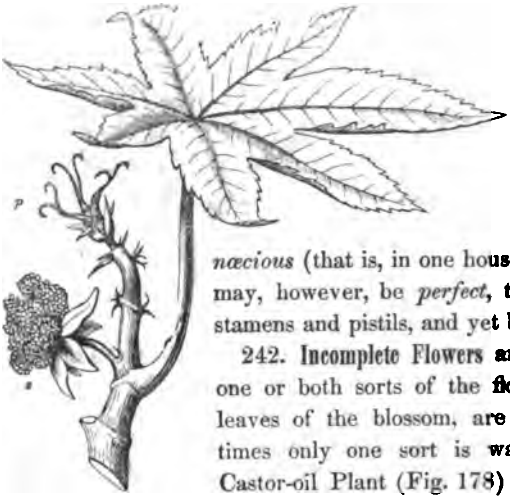
241. Imperfect, or Separated Flowers; which are those where the stamens and pistils are in separate blossoms; that is, one sort of flowers has stamens and no pistils, and another has pistils and no stamens, or only imperfect ones. The blossom which has stamens but no pistils is called a ***staminate*** or ***sterile*** flower (Fig. 176); and the corresponding one with pistils but no stamens is called a ***pistillate*** or ***fertile*** flower (Fig. 177). The two sorts may grow on distinct plants, from different roots, as they do in the Willow and Poplar, the Hemp, and the Moonseed

FIG. 174. Flowers of the common Flax: a perfect, complete, regular, and symmetrical blossom, all its parts in fives. 175. Half of a Flax-flower divided lengthwise, and enlarged.

FIG. 176. Staminate flower of Moonseed (Menispermum Canadense). 177. Pistillate flower of the same.

(Fig. 176, 177); when the flowers are said to be *diœcious* (from two Greek words meaning in two households). Or the two may occur on the same plant or the same stem, as in the Oak, Walnut, Nettle, and the Castor-oil Plant (Fig. 178); when the flowers are said to be *monœcious* (that is, in one household). A flower may, however, be *perfect*, that is, have both stamens and pistils, and yet be *incomplete*.



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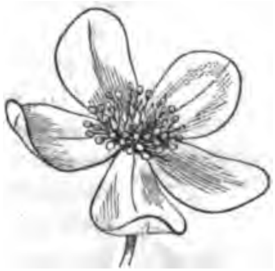
242. **Incomplete Flowers** are those in which one or both sorts of the floral envelopes, or leaves of the blossom, are wanting. Sometimes only one sort is wanting, as in the Castor-oil Plant (Fig. 178) and in the Anemone (Fig. 179). In this case the missing sort is always supposed to be the inner, that is, the corolla; and accordingly such flowers are said to be *apetalous* (meaning without petals). Occasionally both the corolla and the calyx are wanting, when the flower has no proper coverings or floral envelopes at all. It is then said to be *naked*, as in the Lizard's-tail (Fig. 180), and in the Willow.



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243. Our two pattern flowers (Fig. 168, 174) are regular and symmetrical (239). We commonly expect this to be the case in living things. The corresponding parts of plants, like the limbs or members of animals, are generally alike, and the whole arrangement is symmetrical. This symmetry pervades the blossom, especially. But the student may often fail to perceive

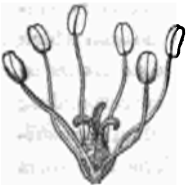

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FIG. 178. Monœcious flowers, i. e. one staminate (*s*) and one pistillate (*p*) flower, of the Castor-oil Plant, growing on the same stem.

FIG. 179. Apetalous (incomplete) flower of Anemone Pennsylvanica.

FIG. 180. A naked (but perfect) flower of the Lizard's-tail.

it, at first view, at least in cases where the plan is more or less obscured by the leaving out (*obliteration*) of one or more of the members of the same set, or by some inequality in their size and shape. The latter circumstance gives rise to

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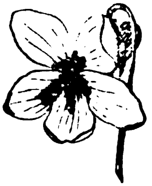

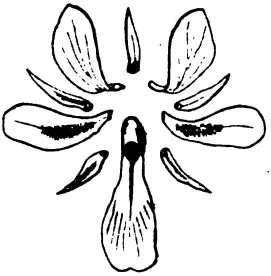

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244. **Irregular Flowers.** This name is given to blossoms in which the different members of the same sort, as, for example, the petals or the stamens, are unlike in size or in form. We have familiar cases of the sort in the Larkspur (Fig. 183, 184), and Monkshood (Fig. 185, 186); also in the Violet (Fig. 181, 182). In the latter it is the corolla principally which is irregular, one of the petals being larger than the rest, and extended at the base into a hollow protuberance or spur. In the Larkspur (Fig. 183), both the calyx and the corolla partake of the irregularity. This and the Monkshood are likewise good examples of

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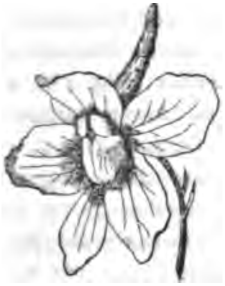

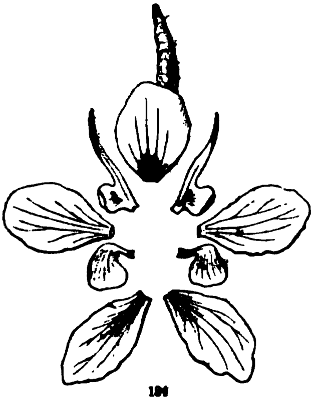

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245. **Unsymmetrical Flowers.** We call them unsymmetrical, when the different sets of organs do not agree in the number of their parts. The irregular calyx of Larkspur (Fig. 183, 184) consists of five sepals, one of which, larger than the rest, is prolonged behind into a large spur; but the corolla is made of only four petals (of two shapes);

FIG. 181. Flower of a Violet. 182. Its calyx and corolla displayed: the five smaller parts are the sepals; the five intervening larger ones are the petals.

FIG. 183. Flower of a Larkspur. 184. Its calyx and corolla displayed; the five larger pieces are the sepals; the four smaller, the petals.

the fifth, needed to complete the symmetry, being left out. And the Monkshood (Fig. 185, 186) has five very dissimilar sepals, and a corolla of only two, very small, curiously-shaped petals; the three needed to make up the symmetry being left out. For a flower which is unsymmetrical but regular, we may take the common Purslane, which has a calyx of only two sepals, but a corolla of five petals, from seven to twelve stamens, and about six styles. The Mustard, and all flowers of that family, are unsymmetrical as to the stamens, these being six in number (Fig. 188, while the leaves of the blossom (sepals and petals) are each only four (Fig. 187). Here the stamens are *irregular* also, two of them being shorter than the other four.

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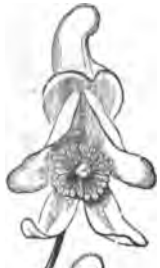

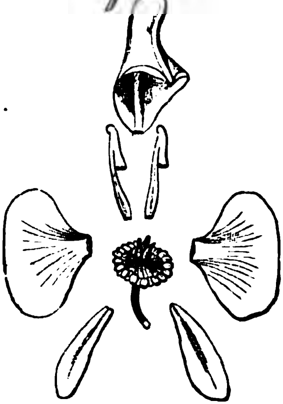

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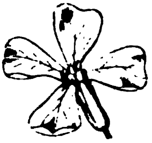

246. Numerical Plan of the Flower. Although not easy to make out in all cases, yet generally it is plain to see that each blossom is based upon a particular number, which runs through all or most of its parts. And a principal thing which a botanist notices when examining a flower is its numerical plan. It is upon this that the symmetry of the blossom depends. Our two pattern flowers, the Stonecrop (Fig. 168) and the Flax (Fig. 174), are based upon the number five, which is exhibited in all their parts. Some flowers of this same Stonecrop have their parts in fours, and then that number runs throughout; namely, there are four sepals, four petals, eight stamens (two sets), and four pistils. The Mustard (Fig. 187, 188), Radish,

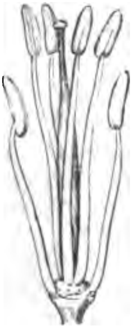

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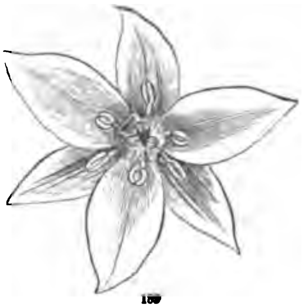
FIG. 185. Flower of a Monkshood. 186. Its parts displayed: the five larger pieces are the sepals; the two small ones under the hood are petals; the stamens and pistils are in the centre.

FIG. 187. Flower of Mustard. 188. Its stamens and pistil separate and enlarged.

&c., also have their flowers constructed on the plan of four as to the calyx and corolla, but this number is interfered with in the stamens, either by the leaving out of two stamens (which would complete two sets), or in some other way. Next to five, the most common number in flowers is three. On this number the flowers of Lily, Crocus, Iris, Spiderwort, and Trillium (Fig. 189) are constructed. In the Lily and Crocus the leaves of the flower at first view appear to be six in one set; but the bud or just-opening blossom plainly shows these to consist of an outer and an inner circle, each of three parts, namely, of calyx and corolla, both of the same bright color and delicate texture. In the Spiderwort and Trillium (Fig. 189) the three outer leaves, or sepals, are green, and different in texture from the three inner, or the petals; the stamens are six (namely, two sets of three each), and the pistils three, though partly grown together into one mass.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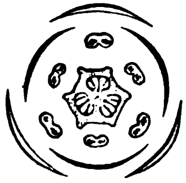
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247. **Alternation of Parts.** The symmetry of the flower is likewise shown in the arrangement or relative position of successive parts. The rule is, that the parts of successive circles *alternate* with one another. That is, the petals stand over the intervals between the sepals; the stamens, when of the same number, stand over the intervals between the petals; or when twice as many, as in the Trillium, the outer set alternates with the petals, and the inner set, alternating with the other, of course stands before the petals; and the pistils alternate with these. This is shown in Fig. 189, and in the diagram, or cross-section of the same in the bud, Fig. 190. And Fig. 191 is a similar diagram or ground-plan (in the form of a

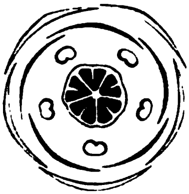
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FIG. 189. Flower of Trillium erectum, or Birthroot, spread out a little, and viewed from above.

FIG. 190. Diagram or ground-plan of the same, as it would appear in a cross-section of the bud;—the parts all in the same relative position.

FIG. 191. Diagram, or ground-plan, of the Flax-flower, Fig. 174

section made across the bud) of the Flax blossom, the example of a pattern symmetrical flower taken at the beginning of this Lesson, with its parts all in fives.

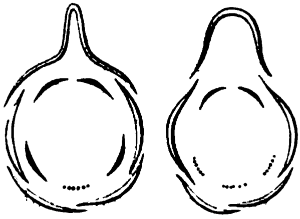

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FIG. 192. Diagram of the calyx and corolla of a Larkspur. 193. Similar diagram of Monkshood. The dotted lines show where the petals are wanting; one in the former, three in the latter.

248. Knowing in this way just the position which each organ should occupy in the flower, it is readily understood that flowers often become unsymmetrical through the loss of some parts, which belong to the plan, but are obliterated or left out in the execution. For example, in the Larkspur (Fig. 183, 184), as there are five sepals, there should be five petals likewise. We find only four; but the vacant place where the fifth belongs is plainly recognized at the lower side of the flower. Also the similar plan of the Monkshood (Fig. 186) equally calls for five petals; but three of them are entirely obliterated, and the two that remain are reduced to slender bodies, which look as unlike ordinary petals as can well be imagined. Yet their position, answering to the intervals between the upper sepals and the side ones, reveals their true nature. All this may perhaps be more plainly shown by corresponding diagrams of the calyx and corolla of the Larkspur and Monkshood (Fig. 192, 193), in which the places of the missing petals are indicated by faint dotted lines. The obliteration of stamens is a still more common case. For example, the Snapdragon, Foxglove, Gerardia, and almost all flowers of the large Figwort family they belong to, have the parts of the calyx and corolla five each, but only four stamens (Fig. 194); the place on the upper side of the flower where the fifth stamen belongs is vacant. That there is in such cases a real obliteration of the missing part is shown by the

249. **Abortive Organs**, or vestiges which are sometimes met with; — bodies which stand in the place of an organ, and represent it, although wholly incapable of fulfilling its office. Thus, in the Figwort family, the fifth stamen, which is altogether missing in Gerardia (Fig. 194) and most others, appears in the Figwort as a little scale, and in Pentstemon (Fig. 195) and Turtlehead as a sort of filament without any anther; — a thing of no use whatever to the plant, but

very interesting to the botanist, since it completes the symmetry of the blossom. And to show that this really is the lost stamen, it now and then bears an anther, or the rudiment of one. So the flower of Catalpa should likewise have five stamens; but we seldom find more than two good ones. Still we may generally discern the three others, as vestiges or half-obliterated stamens (Fig. 196). In separated flowers the rudiments of pistils are often found in the sterile blossom, and rudimentary stamens in the fertile blossom, as in Moonseed (Fig. 177).

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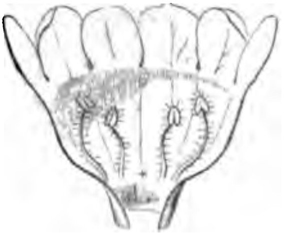

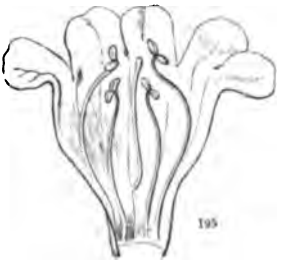

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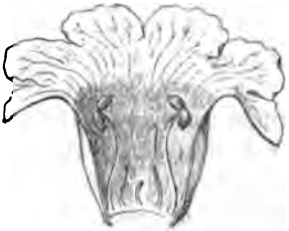

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250. **Multiplication of Parts.** Quite in the opposite way, the simple plan of the flower is often more or less obscured by an increase in the number of parts. In the White Water-Lily, and in many Cactus-flowers (Fig. 197), all the parts are very numerous, so that it is hard to say upon what number the blossom is constructed. But more commonly some of the sets are few and definite in the number of their parts. The Buttercup, for instance, has five sepals and five petals, but many stamens and pistils; so it is built upon the plan of five. The flowers of Magnolia have indefinitely numerous stamens and pistils, and rather numerous floral envelopes; but these latter are plainly distinguishable into sets of three; namely, there are three sepals, and six petals in two circles, or nine in three circles, — showing that these blossoms are constructed on the number three.

FIG. 194. Corolla of a purple Gerardia laid open, showing the four stamens; the cross shows where the fifth stamen would be, if present.

FIG. 195. Corolla, laid open, and stamens of Pentstemon grandiflorus of Iowa, &c., with a sterile filament in the place of the fifth stamen, and representing it.

FIG. 196. Corolla of Catalpa laid open, displaying two good stamens and three abortive vestiges of stamens.

LESSON XIV.

MORPHOLOGY OF THE FLOWER.

251. In all the plant till we came to the blossom we found nothing but root, stem, and leaves (23, 118). However various or strange their shapes, and whatever their use, everything belongs to one of these three organs, and everything above ground (excepting the rare case of aerial roots) is either stem or leaf. We discern the stem equally in the stalk of an herb, the trunk and branches of a tree, the trailing or twining Vine, the straw of Wheat or other Grasses, the columnar trunk of Palms (Fig. 47), in the flattened joints of the Prickly-Pear Cactus, and the rounded body of the Melon Cactus (Fig. 76). Also in the slender runners of the Strawberry, the tendrils of the Grape-vine and Virginia Creeper, the creeping subterranean shoots of the Mint and Couchgrass, the tubers of the Potato and Artichoke, the solid bulb of the Crocus, and the solid part or base of scaly bulbs; as is fully shown in Lesson 6. And in Lesson 7 and elsewhere we have learned to recognize the leaf alike in the thick seed-leaves of the Almond, Bean, Horsechestnut, and the like (Fig. 9 – 24), in the scales of buds (Fig. 77), and the thickened

FIG. 197. A Cactus-flower, viz. of Mamillaria cæspitosa of the Upper Missouri.

scales of bulbs (Fig. 73 – 75), in the spines of the Barberry and the tendrils of the Pea, in the fleshy rosettes of the Houseleek, the strange fly-trap of Dionæa (Fig. 81), and the curious pitcher of Sarracenia (Fig. 79).

252. Now the student who understands these varied forms or *metamorphoses* of the stem and leaf, and knows how to detect the real nature of any part of the plant under any of its disguises, may readily trace the leaf into the blossom also, and perceive that, as to their morphology,

253. **Flowers are altered Branches**, and their parts, therefore, altered leaves. That is, certain buds, which might have grown and lengthened into a leafy branch, do, under other circumstances and to accomplish other purposes, develop into blossoms. In these the axis remains short, nearly as it is in the bud; the leaves therefore remain close together in sets or circles; the outer ones, those of the calyx, generally partake more or less of the character of foliage; the next set are more delicate, and form the corolla, while the rest, the stamens and pistils, appear under forms very different from those of ordinary leaves, and are concerned in the production of seed. This is the way the scientific botanist views a flower; and this view gives to Botany an interest which one who merely notices the shape and counts the parts of blossoms, without understanding their plan, has no conception of.

254. That flowers answer to branches may be shown first from their position. As explained in the Lesson on Inflorescence, flowers arise from the same places as branches, and from no other; flower-buds, like leaf-buds, appear either on the summit of a stem, that is, as a terminal bud, or in the axil of a leaf, as an axillary bud (196). And at an early stage it is often impossible to foretell whether the bud is to give rise to a blossom or to a branch.

255. That the sepals and petals are of the nature of leaves is evident from their appearance; persons who are not botanists commonly call them the leaves of the flower. The calyx is most generally green in color, and foliaceous (leaf-like) in texture. And though the corolla is rarely green, yet neither are proper leaves always green. In our wild Painted-Cup, and in some scarlet Sages, common in gardens, the leaves just under the flowers are of the brightest red or scarlet, often much brighter-colored than the corolla itself. And sometimes (as in many Cactuses, and in Carolina Allspice) there is such a regular gradation from the last leaves of the

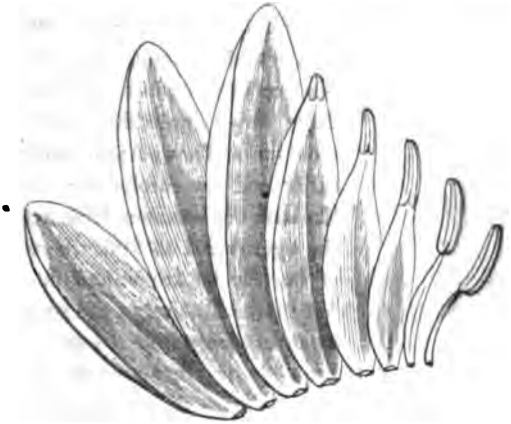
plant (bracts or bractlets) into the leaves of the calyx, that it is impossible to say where the one ends and the other begins. And if sepals are leaves, so also are petals; for there is no clearly fixed limit between them. Not only in the Carolina Allspice and Cactus (Fig. 197), but in the Water-Lily (Fig. 198) and a variety of flowers with more than one row of petals, there is such a complete transition between calyx and corolla that no one can surely tell how many of the leaves belong to the one and how many to the other.

256. It is very true that the calyx or the corolla often takes the form of a cup or tube, instead of being in separate pieces, as in Fig. 194–196. It is then composed of two or more leaves grown together. This is no objection to the petals being leaves; for the same thing takes place with the ordinary leaves of many plants, as, for instance, in the upper ones of Honeysuckles (Fig. 132).

257. That stamens are of the same general nature as petals, and therefore a modification of leaves, is shown by the gradual transitions that occur between the one and the other in many blossoms; especially in cultivated flowers, such as Roses and Camellias, when they begin to *double*, that is, to change their stamens into petals. Some wild and natural flowers show the same interesting transitions. The Carolina Allspice and the White Water-Lily exhibit complete gradations not only between sepals and petals, but between petals and stamens. The sepals of the Water-Lily are green outside, but white and petal-like on the inside; the petals, in many rows, gradually grow narrower towards the centre of the flower; some of these are tipped with a trace of a yellow anther, but still are petals; the next are more contracted and stamen-like, but with a flat petal-like filament; and a further narrowing of this completes the genuine stamen. A series of these stages is shown in Fig. 198.

258. Pistils and stamens now and then change into each other in some Willows; pistils often turn into petals in cultivated flowers; and in the Double Cherry they occasionally change directly into small green leaves. Sometimes a whole blossom changes into a cluster of green leaves, as in the "green roses" which are occasionally noticed in gardens, and sometimes it degenerates into a leafy branch. So the botanist regards pistils also as answering to leaves. And his idea of a pistil is, that it consists of a leaf with its margins curved inwards till they meet and unite to form a closed cavity, the ovary, while the tip is prolonged to form the style and bear the stigma; as will be illustrated in the Lesson upon the Pistil.

259. Moreover, the arrangement of the parts of the flower answers to that of leaves, as illustrated in Lesson 10,—either to a succession of whorls alternating with each other in the manner of whorled leaves, or in some regular form of spiral arrangement.



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LESSON XV.

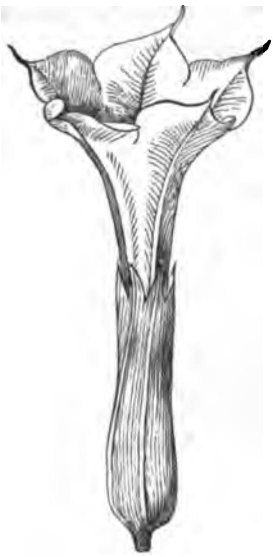
MORPHOLOGY OF THE CALYX AND COROLLA.

260. HAVING studied the flower as a whole, we proceed to consider more particularly its several parts, especially as to the principal differences they present in different plants. We naturally begin with the *leaves of the blossom*, namely, the calyx and corolla. And first as to

261. **The Growing together of Parts.** It is this more than anything else which prevents one from taking the idea, at first sight, that the flower is a sort of very short branch clothed with altered leaves. For most blossoms we meet with have some of their organs grown together more or less. We have noticed it as to the corolla of Gerardia, Catalpa, &c. (Fig. 194–196), in Lesson 13. This growing

FIG. 198. Succession of sepals, petals, gradations between petals and stamens, and true stamens, of the Nymphæa, or White Water-Lily.

together takes place in two ways: either parts of the same kind, or parts of different kinds, may be united. The first we may call simply the *union*, the second the *consolidation*, of parts.



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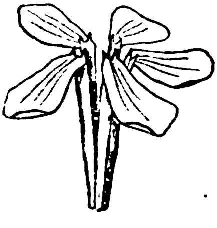
262. **Union or Cohesion** *with one another of parts of the same sort.* We very commonly find that the calyx or the corolla is a cup or tube, instead of a set of leaves. Take, for example, the flower of the Stramonium or Thorn-Apple, where both the calyx and the corolla are so (Fig. 199); likewise the common Morning-Glory, and the figures 201 to 203, where the leaves of the corolla are united into one piece, but those of the calyx are separate. Now there are numerous cases of real leaves growing together much in the same way, — those of the common Thoroughwort, and the upper pairs in Woodbines or Honeysuckles, for example (Fig. 132); so that we might expect it to occur in the leaves of the blossom also. And that this is the right view to take of it plainly appears from the transitions everywhere met with in different plants, between a calyx or a corolla of separate pieces and one forming a perfect tube or cup. Figures 200 to 203 show one complete set of such gradations in the corolla, and Fig. 204 to 206 another, in short and open corollas. How many leaves or petals each corolla is formed of may be seen by the number of points or tips, or of the notches (called *sinuses*) which answer to the intervals between them.

263. When the parts are united in this way, whether much or little, the corolla is said to be *monopetalous*, and the calyx *monosepalous*. These terms mean "of one petal," or "of one sepal"; that is, of one piece. Wherefore, taking the corolla or the calyx as a whole, we say that it is *parted* when the parts are separate almost to the base, as in Fig. 204; *cleft* or *lobed* when the notches do not extend below the middle or thereabouts, as in Fig. 205;

FIG. 199. Flower of the common Stramonium; both the calyx and the corolla with their parts united into a tube.

toothed or *dentate*, when only the tips are separate as short points; *entire*, when the border is even, without points or notches, as in the common Morning-Glory, and very nearly so in Fig. 203; and so on; — the terms being just the same as those applied to leaves and all other flat bodies, and illustrated in Lessons 8 and 9.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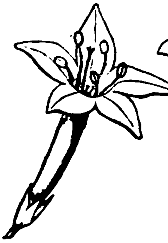
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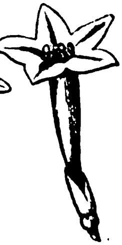
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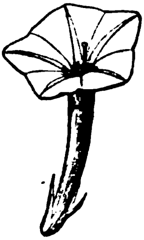
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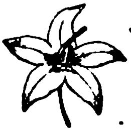
264. There is a set of terms applied particularly to calyxes, corollas, or other such bodies of one piece, to express their general shape, which we see is very various. The following are some of the principal: —

Wheel-shaped, or *rotate*; when spreading out at once, without a tube or with a very short one, something in the shape of a wheel or of its diverging spokes, as in the corolla of the Potato and Bittersweet (Fig. 204, 205).

Salver-shaped, or *salver-form*; when a flat-spreading border is raised on a narrow tube, from which it diverges at right angles, like the salver represented in old pictures, with a slender handle beneath. The corolla of the Phlox (Fig. 208) and of the Cypress-Vine (Fig. 202) are of this sort.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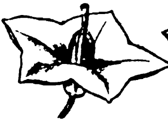
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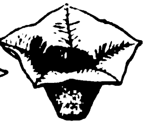
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FIG. 200. Corolla of Soapwort (the same in Pinks, &c.), of 5 separate, long-clawed petals.

FIG. 201. Flower of Gilia or Ipomopsis coronopifolia; the parts answering to the claws of the petals of the last figure here all united into a tube.

FIG. 202. Flower of the Cypress-Vine; the petals a little farther united into a five-lobed spreading border.

FIG. 203. Flower of the small Scarlet Morning-Glory, the five petals it is composed of perfectly united into a trumpet-shaped tube, with the spreading border nearly even (or entire).

FIG. 204. Wheel-shaped and five-parted corolla of Bittersweet (Solanum Dulcamara).

FIG. 205. Wheel-shaped and five-cleft corolla of the common Potato.

FIG. 206. Almost entire and very open bell-shaped corolla of a Ground Cherry (Physalis).

Bell-shaped, or *campanulate;* where a short and broad tube widens upward, in the shape of a bell, as in Fig. 207.

Funnel-shaped, or *funnel-form;* gradually spreading at the summit of a tube which is narrow below, in the shape of a funnel or tunnel, as in the corolla of the common Morning-Glory, and of the Stramonium (Fig. 199).

Tubular; when prolonged into a tube, without much spreading at the border, as in the corolla of the Trumpet Honeysuckle, the calyx of Stramonium (Fig. 199), &c.

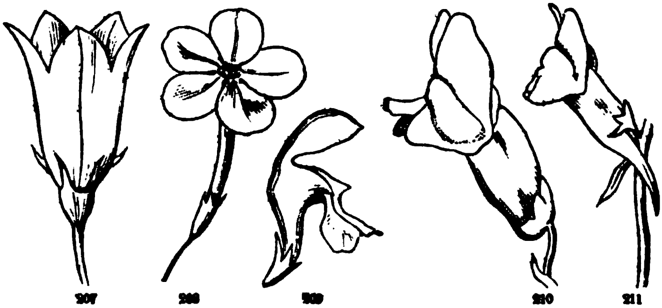


FIG. 207. Flower of the Harebell, with a campanulate or bell-shaped corolla. 208. Of a Phlox, with salver-shaped corolla. 209. Of Dead-Nettle (Lamium), with labiate *ringent* (or gaping) corolla. 210. Of Snapdragon, with labiate *personate* corolla. 211. Of Toad-Flax, with a similar corolla spurred at the base.

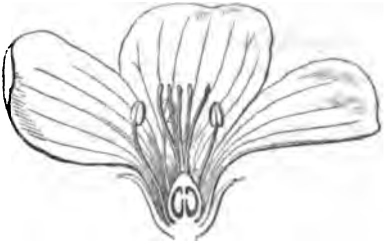
265. In most of these cases we may distinguish two parts; namely, the *tube*, or the portion all in one piece and with its sides upright or nearly so; and the *border* or *limb*, the spreading portion or summit. The limb may be entire, as in Fig. 203, but it is more commonly *lobed*, that is, partly divided, as in Fig. 202, or *parted* down nearly to the top of the tube, as in Fig. 208, &c.

266. So, likewise, a separate petal is sometimes distinguishable into two parts; namely, into a narrowed base or stalk-like part (as in Fig. 200, where this part is peculiarly long), called the *claw*, and a spreading and enlarged summit, or body of the petal, called the *lamina* or *blade*.

267. When parts of the same set are not united (as in the Flax, Cherry, &c., Fig. 212–215), we call them *distinct*. Thus the sepals or the petals are distinct when not at all united with each other. As a calyx with sepals united into one body is called *monosepalous* (263, that is, one-sepalled), or sometimes *monophyllous*, that is, one-leaved; so, on the other hand, when the sepals are distinct, it is said to be

polysepalous, that is, composed of several or many sepals. And a corolla with distinct petals is said to be *polypetalous*.

268. **Consolidation**, *the growing together of the parts of two or more different sets*. In the most natural or pattern flower (as explained in Lessons 13 and 14), the several parts rise from the receptacle or axis in succession, like leaves upon a very short stem; the petals just above or within the sepals, the stamens just above or within these, and then the pistils next the summit or centre. Now when contiguous parts of different sorts, one within the other, unite at their base or origin, it obscures more or less the plan of the flower, by consolidating organs which in the pattern flower are entirely separate.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269. The nature of this consolidation will be at once understood on comparing the following series of illustrations. Fig. 212 represents a flower of the common Flax, cut through lengthwise, so as to show the attachment (or what the botanist calls the *insertion*) of all the parts. Here they are all *inserted* on, that is grow out of, the receptacle or axis of the blossom. In other words, there is no union at all of the parts of contiguous circles. So the parts are said to be *free*. And the sepals, petals, and stamens, all springing of course from beneath the pistils, which are on the very summit of the axis, are said to be *hypogynous* (a term composed of two Greek words, meaning "under the pistil").

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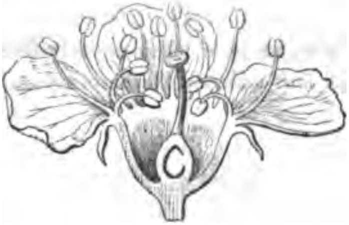

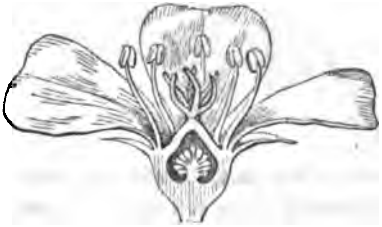
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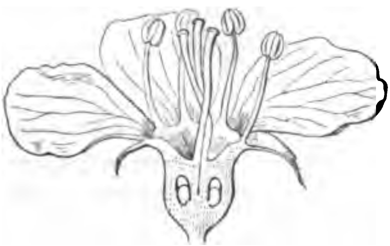
FIG. 212. A Flax-flower, cut through lengthwise.
FIG. 213. Flower of a Cherry, divided in the same way.
FIG. 214. Flower of the common Purslane, divided lengthwise.

270. Fig. 213 is a flower of a Cherry, cut through lengthwise in the same way. Here the petals and the stamens grow out of, that is, are *inserted* on, the calyx; in other words they cohere or are consolidated with the base of the calyx up to a certain height. In such cases they are said to be *perigynous* (from two Greek words, meaning around the pistil). The consolidation in the Cherry is confined to the calyx, corolla, and stamens: the calyx is still *free* from the pistil. One step more we have in

271. Fig. 214, which is a similar section of a flower of a Purslane. Here the lower part of the calyx (carrying with it of course the petals and stamens) is *coherent* with the surface of the whole lower half of the ovary. Therefore the calyx, seeming to rise from the middle of the ovary, is said to be *half superior*, instead of being *inferior*, as it is when entirely free. It is better to say, however, *calyx half-adherent* to the ovary. Every gradation occurs between such a case and that of a calyx altogether *free* or inferior, as we see in different Purslanes and Saxifrages. The consolidation goes farther,

272. In the Apple, Quince, Hawthorn (Fig. 215), &c. Here the tube of the calyx is consolidated with the whole surface of the ovary; and its limb, or free part, therefore appears to spring from its top, instead of underneath it, as it naturally should. So the calyx is said to be *superior*, or (more properly) *adherent* to, or *coherent* with, the ovary. In most cases (and very strikingly in the Evening Primrose), the tube of the calyx is continued on more or less beyond the ovary, and has the petals and stamens consolidated with it for some distance; these last, therefore, being borne on the calyx, are said to be *perigynous*, as before (270).



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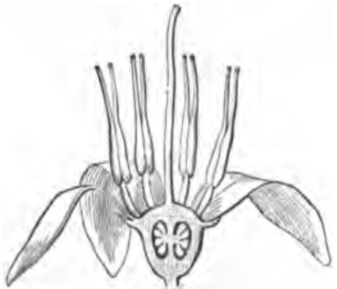

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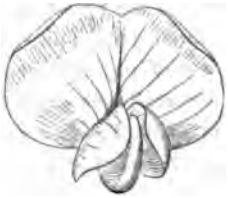
FIG. 215. Flower of a Hawthorn, divided lengthwise.
FIG. 216. Flower of the Cranberry, divided lengthwise.

273. But if the tube of the calyx ends immediately at the summit of the ovary, and its lobes as well as the corolla and stamens are as it were inserted directly on the ovary, they are said to be *epigynous* (meaning on the pistil), as in Cornel, the Huckleberry, and the Cranberry (Fig. 216).

274. **Irregularity of Parts** in the calyx and corolla has already been noticed (244) as sometimes obstructing one's view of the real plan of a flower. There is infinite variety in this respect; but what has already been said will enable the student to understand these irregularities when they occur. We have only room to mention one or two cases which have given rise to particular names. A very common kind, among polypetalous (267) flowers, is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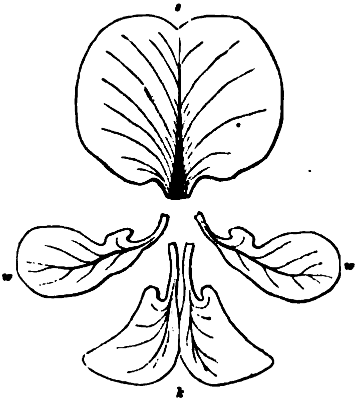
275. The *Papilionaceous* flower of the Pea, Bean, and nearly all that family. In this we have an irregular corolla of a peculiar shape, which Linnæus likened to a butterfly (whence the term, *papilio* being the Latin name for a butterfly); but the resemblance is not very obvious. The five petals of a papilionaceous corolla (Fig. 217) have received different names taken from widely different objects. The upper and larger petal (Fig. 218, *s*), which is generally wrapped round all the rest in the bud, is called the *standard* or *banner*. The two side petals (*w*) are called the *wings*. And the two anterior ones (*k*), the blades of which commonly stick together a little, and which enclose the stamens and pistil in the flower, from their forming a body shaped somewhat like the keel, or rather the prow, of an ancient boat, are together named the *keel*.



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276. The *Labiate* or *bilabiate* (that is, *two-lipped*) flower is a very common form of the monopetalous corolla, as in the Snapdragon

FIG. 217. Front view of the papilionaceous corolla of the Locust-tree. 218. The parts of the same, displayed.

(Fig. 210), Toad-Flax (Fig. 211), Dead-Nettle (Fig. 209), Catnip, Horsemint, &c.; and in the Sage, the Catalpa, &c., the calyx also is two-lipped. This is owing to unequal union of the different parts of the same sort, as well as to diversity of shape. In the corolla two of the petals grow together higher than the rest, sometimes to the very top, and form the *upper lip*, and the three remaining ones join on the other side of the flower to form the *lower lip*, which therefore is more or less three-lobed, while the upper lip is at most only two-lobed. And if the calyx is also two-lipped, as in the Sage, — since the parts of the calyx always alternate with those of the corolla (247), — then the upper lip has three lobes or teeth, namely, is composed of three sepals united, while the lower has only two; which is the reverse of the arrangement in the corolla. So that all these flowers are really constructed on the plan of five, and not on that of two, as one would at first be apt to suppose. In Gerardia, &c. (Fig. 194, 195), the number five is evident in the calyx and corolla, but is more or less obscured in the stamens (249). In Catalpa this number is masked in the calyx by irregular union, and in the stamens by abortion. A different kind of irregular flower is seen in

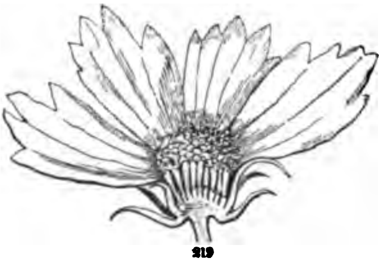
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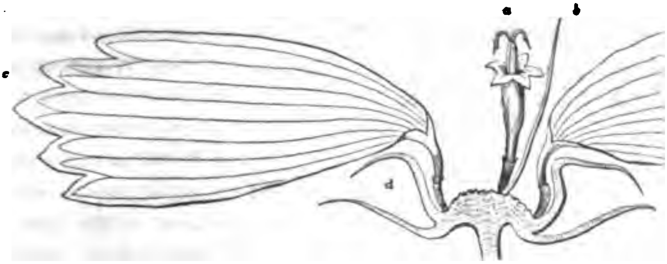
FIG. 219. Head of flowers (the so-called "compound flower") of Coreopsis, divided lengthwise.

277. The *Ligulate* or *strap-shaped* corolla of most *compound flowers*. What was called the compound flower of a Dandelion, Succory (Fig. 221), Thistle, Sunflower, Aster, Whiteweed, &c., consists of many distinct blossoms, closely crowded together into a head, and surrounded by an involucre (208). People who are not botanists commonly take the whole for one flower, the involucre for a calyx, and corollas of the outer or of all the flowers as petals. And this is a very natural mistake when the flowers around the edge have flat and open or strap-shaped corollas, while the rest are regular and tubular, but small, as in the Whiteweed, Sunflower, &c. Fig. 219 represents such a case in a Coreopsis, with the head, or so-called compound flower, cut through; and in Fig. 220 we see one of the perfect flowers of the centre or *disk*, with a regular tubular corolla (*a*), and with the slender bract (*b*) from whose

axil it grew; and also one belonging to the margin, or *ray*, with a strap-shaped corolla (*c*), borne in the axil of a leaf or bract of the involucre (*d*). Here the *ray-flower* consists merely of a strap-shaped corolla, raised on the small rudiment of an ovary; it is therefore a *neutral* flower, like those of the ray or margin of the cluster in Hydrangea (229, Fig. 167), only of a different shape. More commonly the flowers with a strap-shaped corolla are *pistillate*, that is, have a pistil only, and produce seed like the others, as in Whiteweed. But in the Dandelion, Succory (Fig. 221, 222), and all of that tribe, these flowers are perfect, that is, bear both stamens and pistils. And moreover all the flowers of the head are strap-shaped and alike.



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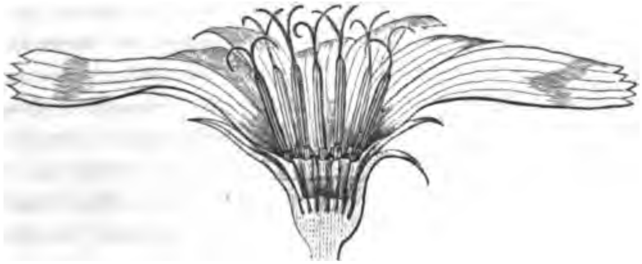

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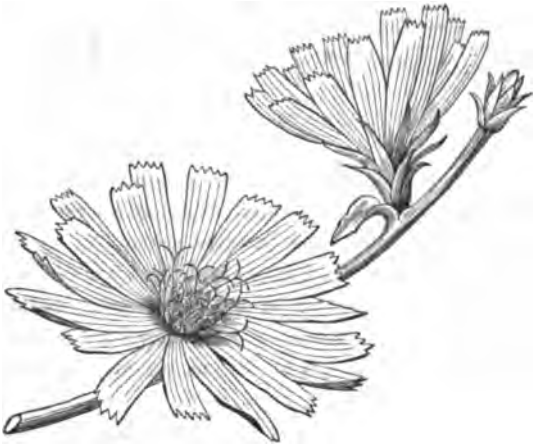
278. Puzzling as these strap-shaped corollas appear at first view, an attentive inspection will generally reveal the plan upon which they are constructed. We can make out pretty plainly, that each one consists of five petals (the tips of which commonly appear as five teeth at the extremity), united by their contiguous edges, except on

FIG. 220. A slice of Fig. 219, more enlarged, with one tubular perfect flower (*a*) left standing on the receptacle, with its bractlet or chaff (*b*), one ligulate, neutral ray-flower (*c*), and part of another: *d*, section of bracts or leaves of the involucre.

FIG. 222. Head of flowers of Succory, cut through lengthwise and enlarged.

one side, and spread out flat. To prove that this is the case, we have only to compare such a corolla (that of Coreopsis, Fig. 220, *c*, or one from the Succory, for instance) with that of the Cardinal-flower, or of any other Lobelia, which is equally split down along one side; and this again with the less irregular corolla of the Woodbine, partially split down on one side.



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LESSON XVI.

ÆSTIVATION, OR THE ARRANGEMENT OF THE CALYX AND COROLLA IN THE BUD.

279. Æstivation or *Præfloration* relates to the way in which the leaves of the flower, or the lobes of the calyx or corolla, are placed with respect to each other in the bud. This is of some importance in distinguishing different families or tribes of plants, being generally very uniform in each. The æstivation is best seen

FIG. 221. Compound flowers, i. e. heads of flowers, of Succory.

by making a horizontal slice of the flower-bud when just ready to open; and it may be expressed in diagrams, as in Fig. 223, 224.

280. The pieces of the calyx or the corolla either overlap each other in the bud, or they do not. When they do not, the æstivation is commonly

Valvate, as it is called when the pieces meet each other by their abrupt edges without any infolding or overlapping; as the calyx of the Linden or Basswood (Fig. 223) and the Mallow, and the corolla of the Grape, Virginia Creeper, &c. Or it may be

Induplicate, which is valvate with the margins of each piece projecting inwards, or involute (like the leaf in Fig. 152), as in the calyx of Virgin's-Bower and the corolla of the Potato, or else

Reduplicate, like the last, but the margins projecting outwards instead of inwards; these last being mere variations of the valvate form.

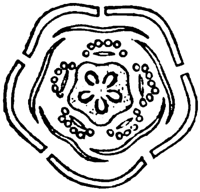
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FIG. 223. Section across the flower-bud of Linden.

281. When the pieces overlap in the bud, it is in one of two ways: either every piece has one edge in and one edge out; or some pieces are wholly outside and others wholly inside. In the first case the æstivation is

Convolute or *twisted*, as in the corolla of Geranium (most commonly, Fig. 224), Flax (Fig. 191), and of the Mallow Family. Here one edge of every petal covers the next before it, while its other edge is covered by the next behind it. In the second case it is

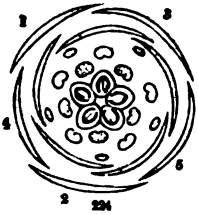

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FIG. 224. Section across the flower-bud of Geranium: the sepals numbered in their order.

Imbricated or *imbricate*, or *breaking joints*, like shingles on a roof, as in the calyx of Geranium (Fig. 224) and of Flax (Fig. 191), and the corolla of the Linden (Fig. 223). In these cases the parts are five in number; and the regular way then is (as in the calyx of the figures above cited) to have two pieces entirely external (1 and 2), one (3) with one edge covered by the first, while the other edge covers that of the adjacent one on the other side, and two (4 and 5) wholly within, their margins at least being covered by the rest. That is, they just represent a circle of five leaves spirally arranged on the five-ranked or $\frac{2}{5}$ plan (187, 188, and Fig. 143 – 145), only with the stem shortened so as to bring the parts close together. The spiral arrangement of the parts of the blossom is the same as that of the foliage,—an additional evidence that the flower is a sort of branch. The petals of the Linden, with only one outside and one inside, as shown in Fig. 223, exhibit a gradation between the imbricated and the convolute modes. When the parts are four in number, generally two opposite ones overlap the other two by both edges. When three in number, then one is outermost, the next has one edge out and the other covered, and the third is within, being covered by the other two; as in Fig. 190. This is just the three-ranked ($\frac{1}{3}$) spiral arrangement of leaves (186, and Fig. 171).

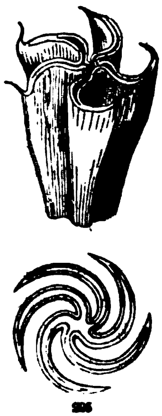
282. In the Mignonette, and some other flowers, the æstivation is *open;* that is, the calyx and corolla are not closed at all over the other parts of the flower, even in the young bud.

283. When the calyx or the corolla is tubular, the shape of the tube in the bud has sometimes to be considered, as well as the way the lobes are arranged. For example, it may be

Plaited or *plicate*, that is, folded lengthwise; and the plaits may either be turned outwards, forming projecting ridges, as in the corolla of Campanula; or turned inwards, as in the corolla of the Gentian, &c. When the plaits are wrapped round all in one direction, so as to cover one another in a convolute manner, the æstivation is said to be

Supervolute, as in the corolla of Stramonium (Fig. 225) and the Morning-Glory; and in the Morning-Glory it is twisted besides.

FIG. 225. Upper part of the corolla of Stramonium (Datura meteloides), in the bud. Underneath is a cross-section of the same.



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LESSON XVII.

MORPHOLOGY OF THE STAMENS.

284. THE STAMENS exhibit nearly the same kinds of variation in different species that the calyx and corolla do. They may be *distinct* (that is, separate from each other, 267) or united. They may be *free* (269), or else *coherent* with other parts: this concerns

285. **Their Insertion**, or place of attachment, which is most commonly the same as that of the corolla. So, stamens are

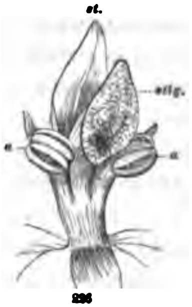
Hypogynous (269), when they are borne on the receptacle, or axis of the flower, under the pistils, as they naturally should be, and as is shown in Fig. 212.

Perigynous, when borne on (that is coherent below with) the calyx; as in the Cherry, Fig. 213.

Epigynous, when borne on the ovary, apparently, as in Fig. 216. To these we may add

Gynandrous (from two Greek words, answering to "stamens and pistil united"), when the stamens are consolidated with the style, so as to be borne by it, as in the Lady's Slipper (Fig. 226) and all the Orchis Family. Also

Epipetalous (meaning on the petals), when they are borne by the corolla; as in Fig. 194, and in most monopetalous blossoms. As to



286. **Their Union with each other**, the stamens may be united by their filaments or by their anthers. In the former case they are

Monadelphous (from two Greek words, meaning "in one brotherhood"), when united by their filaments into one set, usually into a ring or cup below, or into a tube, as in the Mallow Family, the Passion-flower, and the Lupine (Fig. 228).

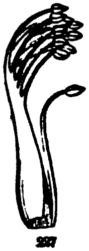
Diadelphous (in two brotherhoods), when so united in two sets, as in the Pea and almost all papilionaceous flowers (275): here the stamens are nine in one set, and one in the other (Fig. 227).

FIG. 226. Style of a Lady's Slipper (Cypripedium), and stamens united with it: *a*, *a*, the anthers of the two good stamens; *st.*, an abortive stamen, what should be its anther changed into a petal-like body; *stig.*, the stigma.

Triadelphous, in three sets or parcels, as in the common St. Johnswort; or

Polyadelphous, when in more numerous sets, as in the Loblolly Bay, where they are in five clusters. On the other hand, stamens are said to be

Syngenesious, when united by their anthers (Fig. 229, 230), as they are in Lobelia, in the Violet (slightly), and in what are called *compound flowers*, such as the Thistle, Sunflower, Coreopsis (Fig. 220), and Succory (Fig. 222). In Lobelia, and in the Squash and Pumpkin, the stamens are united both by their anthers and their filaments.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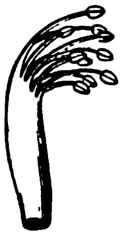
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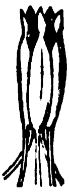
287. **Their Number** in the flower is sometimes expressed by terms compounded of the Greek numerals and the word used to signify stamen; as, *monandrous*, for a flower having only one stamen; *diandrous*, one with two stamens; *triandrous*, with three stamens; *tetrandrous*, with four stamens; *pentandrous*, with five stamens; and so on, up to *polyandrous* (meaning with many stamens), when there are twenty or a larger number, as in a Cactus (Fig. 197). All such terms may be found in the Glossary at the end of the book.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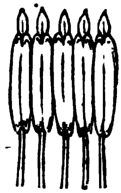
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288. Two terms are used to express particular numbers with unequal length. Namely, the stamens are *didynamous* when only four in number, two longer than the other two, as in the Mint, Catnip, Gerardia (Fig. 194), Trumpet-Creeper, &c.; and *tetradynamous*, when they are six, with four of them regularly longer than the other two, as in Mustard (Fig. 188), and all that family.

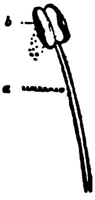
289. **Their Parts.** As already shown (283), a stamen consists of two parts, the *Filament* and the *Anther* (Fig. 231).

290. **The Filament** is a kind of stalk to the anther: it is to the anther nearly what the petiole is to the blade of a leaf. Therefore it is not an essential part. As a leaf may be without a stalk, so the anther may be *sessile*, or without a filament. When present,

FIG. 227. Diadelphous stamens of the Pea, &c. 228. Monadelphous stamens of the Lupine.

FIG. 229. Syngenesious stamens of Coreopsis (Fig. 220, a), &c. 230. Same, with the tube of anthers split down on one side and spread open.

the filament may be of any shape; but it is commonly thread-like, as in Fig. 231, 234, &c.



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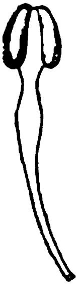
291. **The Anther** is the essential part of the stamen. It is a sort of case, filled with a fine powder, called *Pollen*, which serves to fertilize the pistil, so that it may perfect seeds. The anther may be considered, first, as to

292. **Its Attachment** to the filament. Of this there are three ways; namely, the anther is

Innate (as in Fig. 232), when it is attached by its base to the very apex of the filament, turning neither inwards nor outwards; or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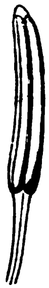
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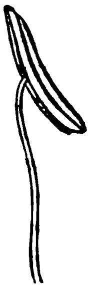
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Adnate (as in Fig. 233), when attached by one face, usually for its whole length, to the side of the filament; and

Versatile (as in Fig. 234), when fixed by its middle only to the very point of the filament, so as to swing loosely, as we see it in the Lily, in Grasses, &c.

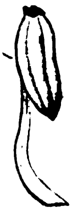
293. In both the last-named cases, the anther either looks inwards or outwards. When it is turned inwards, or is fixed to that side of the filament which looks towards the pistil or centre of the flower, the anther is *incumbent* or *introrse*, as in Magnolia and the Water-Lily. When turned outwards, or fixed to the outer side of the filament, it is *extrorse*, as in the Tulip-tree.

294. **Its Structure**, &c. There are few cases in which the stamen bears any resemblance to a leaf. Nevertheless, the botanist's idea of a stamen is, that it answers to a leaf developed in a peculiar form and for a special purpose. In the filament he sees the stalk of the leaf; in the anther, the blade. The blade of a leaf consists of two similar sides; so the anther consists of two lobes or cells, one answering to the left, the other to the right, side of the blade. The two lobes are often connected by a prolongation of the filament, which answers to the midrib of a leaf: this is called the *connective*. It is very conspicuous in Fig. 232, where the connective is so broad that it separates the two cells of the anther to some distance from each other.

FIG. 231. A stamen: *a*, filament; *b*, anther discharging pollen.

FIG. 232. Stamen of Isopyrum, with innate anther. 233. Of Tulip-tree, with adnate (and extrorse) anther. 234. Of Evening Primrose, with versatile anther.

295. To discharge the pollen, the anther opens (or is *dehiscent*) at maturity, commonly by a line along the whole length of each cell, and which answers to the margin of the leaf (as in Fig. 231); but when the anthers are extrorse, this line is often on the outer face, and when introrse, on the inner face of each cell. Sometimes the anther opens only by a chink, hole, or pore at the top, as in the Azalea, Pyrola or False Wintergreen (Fig. 235), &c.; and sometimes a part of the face separates as a sort of trap-door (or valve), hinged at the top, and opening to allow the escape of the pollen, as in the Sassafras, Spice-bush, and Barberry (Fig. 236). Most anthers are really four-celled when young; a slender partition running lengthwise through each cell and dividing it into two compartments, one answering to the upper, and the other to the lower, layer of the green pulp of the leaf. Occasionally the anther becomes one-celled. This takes place mostly by *confluence*, that is, the two cells running together into one, as they do slightly in Pentstemon (Fig. 237) and thoroughly in the Mallow Family (Fig. 238). But sometimes it occurs by the obliteration or disappearance of one half of the anther, as in the Globe Amaranth of the gardens (Fig. 239).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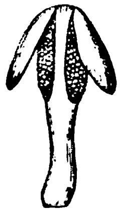
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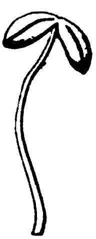
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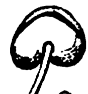
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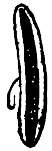
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296. The way in which a stamen is supposed to be constructed out of a leaf, or rather on the plan of a leaf, is shown in Fig. 240, an ideal figure, the lower part representing a stamen with the top of its anther cut away; the upper, the corresponding upper part of a leaf. — The use of the anther is to produce

297. **Pollen.** This is the powder, or fine dust, commonly of a yellow color, which fills the cells of the anther, and is discharged during blossoming, after which the stamens generally fall off or wither away.

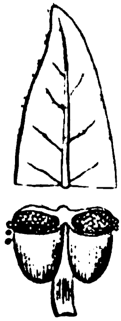
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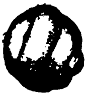
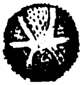
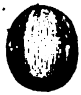
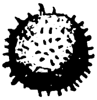
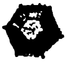
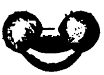
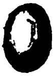
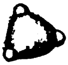
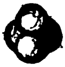
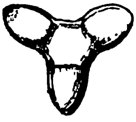
FIG. 235. Stamen of Pyrola; the anther opening by holes at the top.
FIG. 236. Stamen of Barberry; the anther opening by uplifted valves.
FIG. 237. Stamen of Pentstemon pubescens; anther-cells slightly confluent.
FIG. 238. Stamen of Mallow; the two cells confluent into one, opening round the margin.
FIG. 239. Anther of Globe Amaranth, of only one cell; the other cell wanting.
FIG. 240. Diagram of the lower part of an anther, cut across above, and the upper part of a leaf, to show how the one answers to the other.

Under the microscope it is found to consist of grains, usually round or oval, and all alike in the same species, but very different in different plants. So that the plant may sometimes be recognized from the pollen alone.

298. A grain of pollen is made up of two coats; the outer coat thickish, but weak, and frequently adorned with lines or bands, or studded with points; the inner coat is extremely thin and delicate, but extensible, and its cavity is filled with a thickish fluid, often rendered turbid by an immense number of minute grains that float in it. When wet, the grains absorb the water and swell so much that many kinds soon burst and discharge their contents.

299. Figures 241 – 250 represent some common sorts of pollen, magnified one or two hundred diameters, viz.: — A pollen-grain of the Musk Plant, spirally grooved. One of Sicyos, or One-seeded Cucumber, beset with bristly points and marked by smooth bands. One of the Wild Balsam-Apple (Echinocystis), grooved lengthwise. One of Hibiscus or Rose-Mallow, studded with prickly points. One of Succory, many-sided, and dotted with fine points. A grain of the curious compound pollen of Pine. One from the Lily, smooth and oval. One from Enchanter's Nightshade, with three small lobes on the angles. Pollen of Kalmia, composed of four grains united, as in all the Heath family. A grain from an Evening Primrose, with a central body and three large lobes. The figures number from left to right, beginning at the top.

LESSON XVIII.

MORPHOLOGY OF PISTILS.

300. THE PISTIL, when only one, occupies the centre of the flower; when there are two pistils, they stand facing each other in the centre of the flower; when several, they commonly form a ring or circle; and when very numerous, they are generally crowded in rows or spiral lines on the surface of a more or less enlarged or elongated receptacle.

301. Their number in a blossom is sometimes expressed, in Systematic Botany, by terms compounded of the Greek numerals and the Greek word used to signify pistil, in the following way. A flower with one pistil is said to be *monogynous;* with two, *digynous;* with three, *trigynous;* with four, *tetragynous;* with five, *pentagynous*, and so on; with many pistils, *polygynous*, — terms which are explained in the Glossary, but which there is no need to commit to memory.

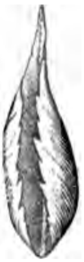
302. **The Parts of a Pistil**, as already explained (234), are the *Ovary*, the *Style*, and the *Stigma*. The ovary is one essential part: it contains the rudiments of seeds, called *Ovules*. The stigma at the summit is also essential: it receives the pollen, which fertilizes the ovules in order that they may become seeds. But the style, the tapering or slender column commonly borne on the summit of the ovary, and bearing the stigma on its apex or its side, is no more necessary to a pistil than the filament is to the stamen. Accordingly, there is no style in many pistils: in these the stigma is *sessile*, that is, rests directly on the ovary. The stigma is very various in shape and appearance, being sometimes a little knob (as in the Cherry, Fig. 213), sometimes a small point, or small surface of bare, moist tissue (as in Fig. 254 – 256), and sometimes a longitudinal crest or line (as in Fig. 252, 258, 267, 269), and also exhibiting many other shapes.

303. The pistil exhibits an almost infinite variety of forms, and many complications. To understand these, it is needful to begin with the simple kinds, and to proceed gradually to the complex. And, first of all, the student should get a clear notion of

304. **The Plan or Ideal Structure of the Pistil**, or, in other words, of the way in which a simple pistil answers to a leaf. Pistils are either

simple or *compound.* A simple pistil answers to a single leaf. A compound pistil answers to two or more leaves combined, just as a monopetalous corolla (263) answers to two or more petals, or leaves of the flower, united into one body. In theory, accordingly,

305. **The Simple Pistil, or Carpel** (as it is sometimes called), consists of the blade of a leaf, curved until the margins meet and unite, forming in this way a closed case or pod, which is the ovary. So that the upper face of the altered leaf answers to the inner surface of the ovary, and the lower, to its outer surface. And the ovules are borne on what answers to the united edges of the leaf. The tapering summit, rolled together and prolonged, forms the style, when there is any; and the edges of the altered leaf turned outwards, either at the tip or along the inner side of the style, form the stigma. To make this perfectly clear, compare a leaf folded together in this way (as in Fig. 251) with a pistil of a Garden Pæony, or Larkspur, or with that in Fig. 252; or, later in the season, notice how these, as ripe pods, split down along the line formed by the united edges, and open out again into a sort of leaf, as in the Marsh-Marigold (Fig. 253). In the Double-flowering Cherry the pistil occasionally is found changed back again into a small green leaf, partly folded, much as in Fig. 251.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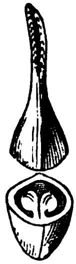
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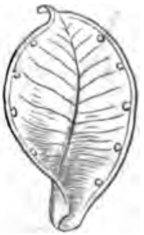
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306. Fig. 172 represents a simple pistil on a larger scale, the ovary cut through to show how the ovules (when numerous) are attached to what answers to the two margins of the leaf. The Stonecrop (Fig. 168) has five such pistils in a circle, each with the side where the ovules are attached turned to the centre of the flower.

307. The line or seam down the inner side, which answers to the united edges of the leaf, and bears the ovules, is called the *ventral* or *inner Suture.* A corresponding line down the back of the ovary, and which answers to the middle of the leaf, is named the *dorsal* or *outer Suture.*

308. The ventral suture inside, where it projects a little into the

FIG. 251. A leaf rolled up inwards, to show how the pistil is supposed to be formed.

FIG. 252. Pistil of Isopyrum biternatum cut across, with the inner suture turned towards the eye.

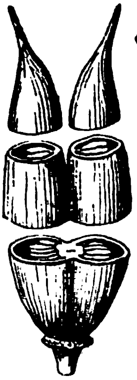
FIG. 253. Pod or ripe pistil of the Caltha, or Marsh-Marigold, after opening.

cavity of the ovary, and bears the ovules, is called the *Placenta.* Obviously a simple pistil can have but one placenta; but this is in its nature double, one half answering to each margin of the leaf. And if the ovules or seeds are at all numerous, they will be found to occupy two rows, one for each margin, as we see in Fig. 252, 172, in the Marsh-Marigold, in a Pea-pod, and the like.

309. A simple pistil obviously can have but one cavity or cell; except from some condition out of the natural order of things. But the converse does not hold true: all pistils of a single cell are not simple. Many compound pistils are one-celled.

310. A simple pistil necessarily has but one style. Its stigma, however, may be double, like the placenta, and for the same reason (305); and it often exhibits two lines or crests, as in Fig. 252, or it may even be split into two lobes.

311. **The Compound Pistil** consists of two, three, or any greater number of pistil-leaves, or carpels (305), in a circle, united into one body, at least by their ovaries. The Cultivated Flax, for example (Fig. 212), has a compound pistil composed of five simple ones with their ovaries united, while the five styles are separate. But in one of our wild species of Flax, the styles are united into one also, for about half their length. So the Common St. John's-wort of the fields has a compound ovary, of three united carpels, but the three styles are separate (Fig. 255), while some of our wild, shrubby species have the styles also combined into one (Fig. 256), although in the fruit they often split into three again. Even the ovaries may only partially combine with each other, as we see in different species of Saxifrage, some having their two pistils nearly separate, while in others they



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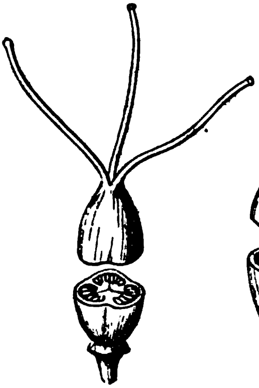

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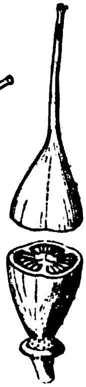

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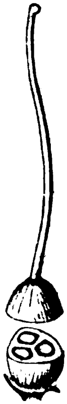
FIG. 254. Pistil of a Saxifrage, of two simple carpels or pistil-leaves, united at the base only, cut across both above and below.

FIG. 255. Compound pistil of common St. John's-wort, cut across: styles separate.

FIG. 256. The same of shrubby St. John's-wort; the three styles united into one.

are joined at the base only, or else below the middle (as in Fig. 254), and in some they are united quite to the top.

312. Even when the styles are all consolidated into one, the stigmas are often separate, or enough so to show by the number of their lobes how many simple pistils are combined to make the compound one. In the common Lily, for instance, the three lobes of the stigma, as well as the three grooves down the ovary, plainly tell us that the pistil is made of three combined. But in the Day-Lily the three lobes of the stigma are barely discernible by the naked eye, and in the Spiderwort (Fig. 257) they are as perfectly united into one as the ovaries and styles are. Here the number of cells in the ovary alone shows that the pistil is compound. These are all cases of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313. **Compound Pistils with two or more Cells,** namely, with as many cells as there are simple pistils, or carpels, that have united to compose the organ. They are just what would be formed if the simple pistils (two, three, or five in a circle, as the case may be), like those of a Pæony or Stonecrop, all pressed together in the centre of the flower, were to cohere by their contiguous parts.

314. As each simple ovary has its placenta, or seed-bearing line (308), at the inner angle, so the resulting compound ovary has as many *axile placentæ* (that is, as many placentæ in the axis or centre) as there are pistil-leaves in its composition, but all more or less consolidated into one. This is shown in the cross-sections, Fig. 254–256, &c.

315. The partitions (or *Dissepiments,* as they are technically named) of a compound ovary are accordingly part of the walls or the sides of the carpels which compose it. Of course they are double, one layer belonging to each carpel; and in ripe pods they often split into the two layers.

316. We have described only one, though the commonest, kind of compound pistil. There are besides

317. **One-celled Compound Pistils.** These are of two sorts, those with *axile,* and those with *parietal placentæ.* That is, first, where the ovules or seeds are borne in the axis or centre of the ovary, and, secondly, where they are borne on its walls. The first of these cases, or that

FIG. 257. Pistil of Spiderwort (Tradescantia): the three-celled ovary cut across.

318. **With a Free Central Placenta,** is what we find in Purslane (Fig. 214), and in most Chickweeds (Fig. 258, 259) and Pinks. The difference between this and the foregoing case is only that the delicate partitions have very early vanished; and traces of them may often be detected. Or sometimes this is a variation of the mode

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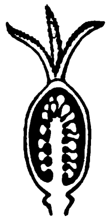
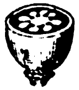


319. **With Parietal Placentæ,** namely, with the ovules and seeds borne on the sides or wall (*parietes*) of the ovary. The pistil of the Prickly Poppy, Bloodroot, Violet, Frost-weed (Fig. 261), Gooseberry, and of many Hypericums, are of this sort. To understand it perfectly, we have only to imagine two, three, or any number of carpel-leaves (like that of Fig. 251), arranged in a circle, to unite by their contiguous edges, and so form one ovary or pod (as we have endeavored to show in Fig. 260); —very much as in the Stramonium (Fig. 199) the five petals unite by their edges to compose a monopetalous corolla, and the five sepals to form a tubular calyx. Here each carpel is an open leaf, or partly open, bearing ovules along its margins; and each placenta consists of the contiguous margins of two pistil-leaves grown together.



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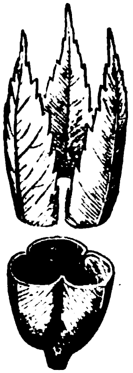

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320. All degrees occur between this and the several-celled ovary with the placentæ in the axis. Compare, for illustration, the common St. John's-worts, Fig. 255 and 256, with Fig. 262, a cross-section of the ovary of a different species, in which the three large placentæ meet in the axis, but scarcely unite, and with Fig. 263, a similar section of the ripe pod of the same plant, showing three parietal placentæ borne on imperfect partitions projecting a little way into the general cell. Fig. 261 is the same in plan, but with hardly any trace of partitions; that is, the united edges of the leaves only slightly project into the cell.

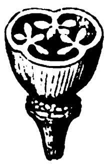

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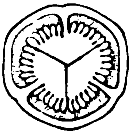
FIG. 258. Pistil of a Sandwort, with the ovary divided lengthwise; and 259, the same divided transversely, to show the free central placenta.

FIG. 260. Plan of a one-celled ovary of three carpel-leaves, with parietal placentæ, cut across below, where it is complete; the upper part showing the top of the three leaves it is composed of, approaching, but not united.

FIG. 261. Cross-section of the ovary of Frost-weed (Helianthemum), with three parietal placentæ, bearing ovules.

321. The ovary, especially when compound, is often covered by and united with the tube of the calyx, as has already been explained (272). We describe this by saying either "ovary adherent," or "calyx adherent," &c. Or we say "*ovary inferior*," when the tube of the calyx is adherent throughout to the surface of the ovary, so that its lobes, and all the rest of the flower, appear to be borne on its summit, as in Fig. 215 and Fig. 216; or "*half-inferior*," as in the Purslane (Fig. 214), where the calyx is adherent part way up; or "*superior*," where the calyx and the ovary are not combined, as in the Cherry (Fig. 213) and the like, that is, where these parts are *free*. The term "ovary superior," therefore, means just the same as "calyx inferior"; and "ovary inferior," the same as "calyx superior."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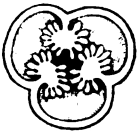
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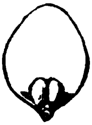
322. **Open or Gymnospermous Pistil.** This is what we have in the whole Pine family, the most peculiar, and yet the simplest, of all pistils. While the ordinary simple pistil in the eye of the botanist represents a leaf rolled together into a closed pod (305), those of the Pine, Larch (Fig. 264), Cedar, and Arbor-Vitæ (Fig. 265, 266) are plainly open leaves, in the form of scales, each bearing two or more ovules on the inner face, next the base. At the time of blossoming, these pistil-leaves of the young cone diverge, and the pollen, so abundantly shed from the staminate blossoms, falls directly upon the exposed ovules. Afterwards the scales close over each other until the seeds are ripe. Then they separate again, that the seeds may be shed. As their ovules and seeds are not enclosed in a pod, all such plants are said to be *Gymnospermous*, that is, *naked-seeded*.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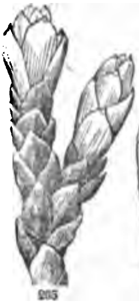
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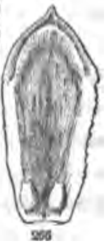
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FIG. 262. Cross-section of the ovary of Hypericum graveolens. 263. Similar section of the ripe pod of the same.

FIG. 264. A pistil, that is, a scale of the cone, of a Larch, at the time of flowering; inside view, showing its pair of naked ovules.

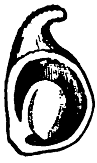
FIG. 265. Branchlet of the American Arbor-Vitæ, considerably larger than in nature, terminated by its pistillate flowers, each consisting of a single scale (an open pistil), together forming a small cone.

FIG. 266. One of the scales or pistils of the last, removed and more enlarged, the inside exposed to view, showing a pair of ovules on its base.

323. **Ovules** (234). These are the bodies which are to become seeds. They are either *sessile*, that is, stalkless, or else borne on a stalk, called the *Funiculus*. They may be produced along the whole length of the cell, or only at some part of it, generally either at the top or the bottom. In the former case they are apt to be numerous; in the latter, they may be few or single (*solitary*, Fig. 267 – 269). As to their direction, ovules are said to be

Horizontal, when they are neither turned upwards nor downwards, as in Fig. 252, 261;

Ascending, when rising obliquely upwards, usually from the side of the cell, not from its very base, as in the Buttercup (Fig. 267), and the Purslane (Fig. 214);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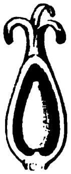
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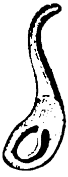
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Erect, when rising upright from the base of the cell, as in the Buckwheat (Fig. 268);

Pendulous, when hanging from towards the top, as in the Flax (Fig. 212); and

Suspended, when hanging perpendicularly from the very summit of the cell, as in the Anemone (Fig. 269), Dogwood, &c. All these terms equally apply to seeds.

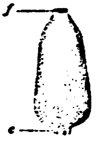
324. An ovule consists of a pulpy mass of tissue, the *Nucleus* or kernel, and usually of one or two coats. In the nucleus the embryo is formed, and the coats become the skin or coverings of the seed. There is a hole (*Orifice* or *Foramen*) through the coats, at the place which answers to the apex of the ovule. The part by which the ovule is attached is its base; the point of attachment, where the ripe seed breaks away and leaves a scar, is named the *Hilum*. The place where the coats blend, and cohere with each other and with the nucleus, is named the *Chalaza*. We will point out these parts in illustrating the four principal kinds of ovule. These are not difficult to understand, although ovules are usually so small that a good magnifying-glass is needed for their examination. Moreover, their names, all taken from the Greek, are unfortunately rather formidable.

325. The simplest sort, although the least common, is what is called the

Orthotropous, or *straight* ovule. The Buckwheat affords a good

FIG. 267. Section of the ovary of a Buttercup, lengthwise, showing its ascending ovule.
FIG. 268. Section of the ovary of Buckwheat, showing the erect ovule.
FIG. 269. Section of the ovary of Anemone, showing its suspended ovule.

instance of it: it is shown in its place in the ovary in Fig. 268, also detached in Fig. 270, and a much more magnified diagram of it in Fig. 274. In this kind, the orifice (*f*) is at the top, the chalaza and the hilum (*c*) are blended at the base or point of attachment, which is at the opposite end; and the axis of the ovule is straight.



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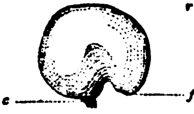

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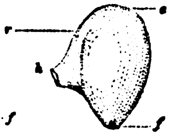

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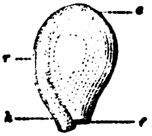

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If such an ovule were to grow on one side more than on the other, and double up, or have its top pushed round as it enlarges, it would become a

Campylotropous or *curved* ovule, as in Cress and Chickweed (Fig. 271). Here the base remains as in the straight kind, but its apex with the orifice is brought round close to it. — Much the most common form of all is the

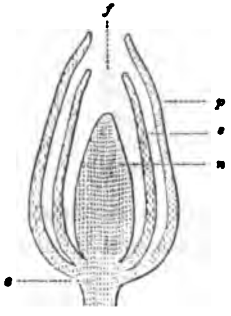
Anatropous or *inverted* ovule. This is shown in Fig. 267, and 273; also a much enlarged section lengthwise, or diagram, in Fig. 275. To understand it, we have only to suppose the first sort (Fig. 270) to be inverted on its stalk, or rather to have its stalk bent round, applied to one side of the ovule lengthwise, and to grow fast to the coat down to near the orifice (*f*); the hilum, therefore, where the seed-stalk is to break away (*h*), is close to the orifice; but the chalaza (*c*) is here at the top of the ovule; between it and the hilum runs a ridge or cord, called the *Rhaphe* (*r*), which is simply that part of the stalk which, as the ovule grew and turned over, adhered to its surface. — Lastly, the

Amphitropous or *half-anatropous* ovule (Fig. 272) differs from the last only in having a shorter rhaphe, ending about half-way between the chalaza and the orifice. So the hilum or attachment is not far from the middle of one side, while the chalaza is at one end and the orifice at the other.

326. The internal structure of the ovule is sufficiently displayed in the subjoined diagrams, representing a longitudinal slice of two

FIG. 270. Orthotropous ovule of Buckwheat: *c*, hilum and chalaza; *f*, orifice.
FIG. 271. Campylotropous ovule of a Chickweed: *c*, hilum and chalaza; *f*, orifice.
FIG. 272. Amphitropous ovule of Mallow: *f*, orifice; *h*, hilum; *r*, rhaphe; *c*, chalaza.
FIG. 273. Anatropous ovule of a Violet; the parts lettered as in the last.

ovules; Fig. 274, an orthotropous, Fig. 275, an anatropous ovule. The letters correspond in the two; *c*, the chalaza; *f*, the orifice; *r*, rhaphe (of which there is of course none in Fig. 274); *p*, the outer coat, called *primine; s*, inner coat, called *secundine; n*, nucleus or kernel.



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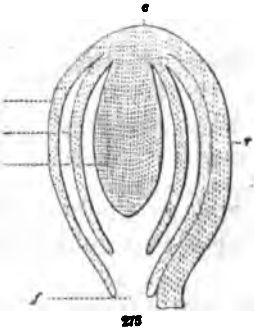

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LESSON XIX.

MORPHOLOGY OF THE RECEPTACLE.

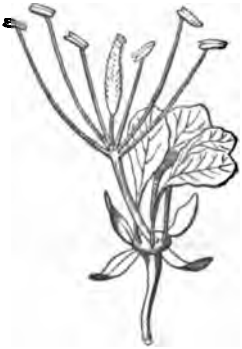
327. **The Receptacle** (also called the *Torus*) is the axis, or stem, which the leaves and other parts of the blossom are attached to (231). It is commonly small and short (as in Fig. 169); but it sometimes occurs in more conspicuous and remarkable forms.

328. Occasionally it is elongated, as in some plants of the Caper family (Fig. 276), making the flower really look like a branch, having its circles of leaves, stamens, &c., separated by long spaces or internodes.

329. The Wild Geranium or Cranesbill has the receptacle prolonged above and between the insertion of the pistils, in the form of a slender beak. In the blossom, and until the fruit is ripe, it is concealed by the five pistils united around it, and their flat styles covering its whole surface (Fig. 277). But at maturity, the five small and one-seeded fruits separate, and so do their styles, from the beak, and hang suspended from the summit. They split off elasti-

cally from the receptacle, curving upwards with a sudden jerk, which scatters the seed, often throwing it to a considerable distance.

330. When a flower bears a great many pistils, its receptacle is generally enlarged so as to give them room; sometimes becoming broad and flat, as in the Flowering Raspberry, sometimes elongated, as in the Blackberry, the Magnolia, &c. It is the receptacle in the Strawberry (Fig. 279), much enlarged and pulpy when ripe, which forms the eatable part of the fruit, and bears the small seed-like pistils on its surface. In the Rose (Fig. 280), instead of being convex or conical, the receptacle is deeply concave, or urn-shaped. Indeed, a Rose-hip may be likened to a strawberry turned inside out, like the finger of a glove reversed, and the whole covered by the adherent tube of the calyx, which remains beneath in the strawberry.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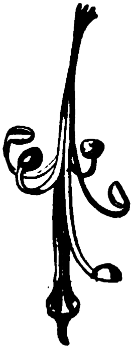
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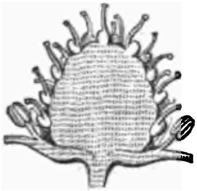
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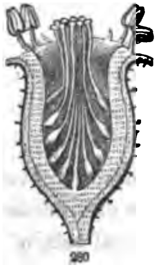
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331. **A Disk** is a part of the receptacle, or a growth from it, enlarged under or around the pistil. It is *hypogynous* (269), when free from all union either with the pistil or the calyx, as in the Rue and the Orange (Fig. 281). It is *perigynous* (270), when it adheres to the base of the calyx, as in the Bladder-nut and Buckthorn (Fig. 282,

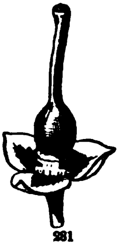
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FIG. 276. Flower of Gynandropsis, the receptacle enlarged and flattened where it bears the sepals and petals, then elongated into a slender stalk, bearing the stamens (in appearance, but they are monadelphous) above its middle, and a compound ovary on its summit.

FIG. 277. Young fruit of the common Wild Cranesbill.

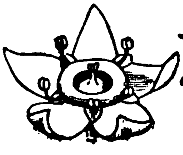
FIG. 278. The same, ripe, with the five pistils splitting away from the long beak or receptacle, and hanging from its top by their styles.

FIG. 279. Longitudinal section of a young strawberry, enlarged.

FIG. 280. Similar section of a young Rose-hip.

FIG. 281. Pistil of the Orange, with a large hypogynous disk at its base.

283). Often it adheres both to the calyx and to the ovary, as in New Jersey Tea, the Apple, &c., consolidating the whole together. In such cases it is sometimes carried up and expanded on the top of the ovary, as in the Parsley and the Ginseng families, when it is said to be *epigynous* (273).



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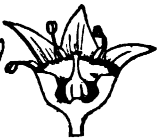

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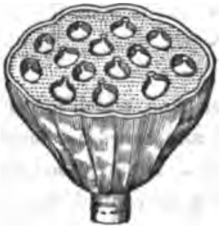
332. In Nelumbium, — a large Water-Lily, abounding in the waters of our Western States, — the singular and greatly enlarged receptacle is shaped like a top, and bears the small pistils immersed in separate cavities of its flat upper surface (Fig. 284).



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LESSON XX.

THE FRUIT.

333. The ripened ovary, with its contents, becomes the *Fruit*. When the tube of the calyx adheres to the ovary, it also becomes a part of the fruit: sometimes it even forms the principal bulk of it, as in the apple and pear.

334. Some fruits, as they are commonly called, are not fruits at all in the strict botanical sense. A strawberry, for example (as we have just seen, 330, Fig. 282), although one of the choicest *fruits* in the common acceptation, is only an enlarged and pulpy receptacle, bearing the real fruits (that is, the ripened pistils) scattered over its

FIG. 282. Flower of a Buckthorn, with a large perigynous disk. 283. The same, divided.
FIG. 284. Receptacle of Nelumbium, in fruit.

surface, and too small to be much noticed. And mulberries, figs, and pine-apples are masses of many fruits with a pulpy flower-stalk, &c. Passing these by for the present, let us now consider only

335. **Simple Fruits.** These are such as are formed by the ripening of a single pistil, whether simple (305) or compound (311).

336. A simple fruit consists, then, of the *Seed-vessel* (technically called the *Pericarp*), or the walls of the ovary matured, and the seeds, contained in it. Its structure is generally the same as that of the ovary, but not always; because certain changes may take place after flowering. The commonest change is the obliteration in the growing fruit of some parts which existed in the pistil at the time of flowering. The ovary of a Horsechestnut, for instance, has three cells and two ovules in each cell; but the fruit never has more than three seeds, and rarely more than one or two, and only as many cells. Yet the vestiges of the seeds that have not matured, and of the wanting cells of the pod, may always be detected in the ripe fruit. This obliteration is more complete in the Oak and Chestnut. The ovary of the first likewise has three cells, that of the second six or seven cells, each with two ovules hanging from the summit. We might therefore expect the acorn and the chestnut to have as many cells, and two seeds in each cell. Whereas, in fact, all the cells and all the ovules but one are uniformly obliterated in the forming fruit, which thus becomes one-celled and one-seeded, and rarely can any vestige be found of the missing parts.

337. On the other hand, a one-celled ovary sometimes becomes several-celled in the fruit by the formation of false partitions, commonly by cross-partitions, as in the jointed pod of the Sea-Rocket and the Tick-Trefoil (Fig. 304).

338. **Their Kinds.** In defining the principal kinds of simple fruits which have particular names, we may classify them, in the first place, into,—1. *Fleshy Fruits*; 2. *Stone Fruits*; and 3. *Dry Fruits*. The first and second are of course *indehiscent;* that is, they do not split open when ripe to discharge the seeds.

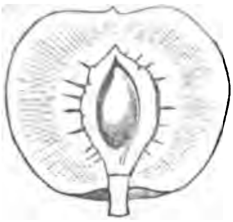
339. In *fleshy fruits* the whole pericarp, or wall of the ovary, thickens and becomes soft (fleshy, juicy, or pulpy) as it ripens. Of this the leading kind is

340. **The Berry**, such as the gooseberry and currant, the blueberry and cranberry, the tomato, and the grape. Here the whole flesh is equally soft throughout. The orange is merely a berry with a leathery rind.

341. **The Pepo**, or *Gourd-fruit*, is the sort of berry which belongs to the Gourd family, mostly with a hard rind and the inner portion softer. The pumpkin, squash, cucumber, and melon are the principal examples.

342. **The Pome** is a name applied to the apple, pear, and quince; fleshy fruits like a berry, but the principal thickness is calyx, only the papery pods arranged like a star in the core really belonging to the pistil itself (333).

343. Secondly, as to fruits which are partly fleshy and partly hard, one of the most familiar kinds is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344. **The Drupe**, or *Stone-fruit;* of which the cherry, plum, and peach (Fig. 285) are familiar examples. In this the outer part of the thickness of the pericarp becomes fleshy, or softens, like a berry, while the inner hardens, like a nut. From the way in which the pistil is constructed (305), it is evident that the fleshy part here answers to the lower, and the stone to the upper, side of the leaf; — a leaf always consisting of two layers of green pulp, an upper and an under layer, which are considerably different (439).

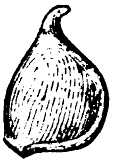
345. Whenever the walls of a fruit are separable into two layers, the outer layer is called the *Exocarp*, the inner, the *Endocarp* (from Greek words meaning "outside fruit" and "inside fruit"). But in a drupe the outer portion, being fleshy, is likewise called *Sarcocarp* (which means "fleshy fruit"), and the inner, the *Putamen* or stone. The stone of a peach, and the like, it will be perceived, belongs to the fruit, not to the seed. When the walls are separable into three layers, the outer layer is named either exocarp or *Epicarp;* the middle one is called the *Mesocarp* (i. e. middle fruit); and the innermost, as before, the *Endocarp*.

346. Thirdly, in *dry fruits* the seed-vessel remains herbaceous in texture, or becomes thin and membranaceous, or else it hardens throughout. Some forms remain closed, that is, are *indehiscent* (338); others are *dehiscent*, that is, split open at maturity in some regular way. Of indehiscent or closed dry fruits the principal kinds are the following.

347. **The Achenium**, or *Akene*, is a small, one-seeded, dry, indehis-

FIG. 285. Longitudinal section of a peach, showing the flesh, the stone, and the seed.

cent fruit, such as is popularly taken for a naked seed: but it is plainly a ripened ovary, and shows the remains of its style or stigma, or the place from which it has fallen. Of this sort are the fruits of the Buttercup (Fig. 286, 287), the Cinque-foil, and the Strawberry (Fig. 279, 288); that is, the real fruits, botanically speaking, of the latter, which are taken for seeds, not the large juicy receptacle on the surface of which they rest (330). Here the akenes are simple pistils (305), very numerous in the same flower, and forming a head of such fruits. In the Nettle, Hemp, &c., there is only one pistil to each blossom.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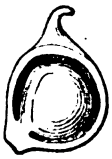
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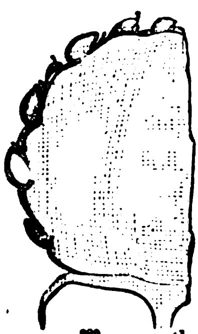

348. In the raspberry and blackberry, each grain is a similar pistil, like that of the strawberry in the flower, but ripening into a miniature stone-fruit, or drupe. So that in the strawberry we eat the receptacle, or end of the flower-stalk; in the raspberry, a cluster of stone-fruits, like cherries on a very small scale; and in the blackberry, both a juicy receptacle and a cluster of stone-fruits covering it (Fig. 289, 290).

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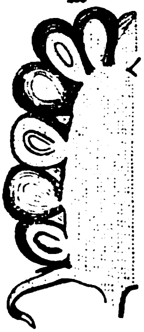

349. The fruit of the Composite family is also an achenium. Here the surface of the ovary is covered by an adherent calyx-tube, as is evident from the position of the corolla, apparently standing on its summit (321, and Fig. 220, *a*). Sometimes the limb or divisions of the calyx are entirely wanting, as in Mayweed (Fig. 291) and Whiteweed. Sometimes the limb of the calyx forms a *crown* or cup on the top of the achenium, as in Succory (Fig. 292); in Coreopsis, it often takes the form of two blunt teeth or scales; in the Sunflower (Fig. 293), it consists of two

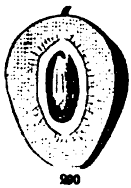
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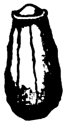
FIG. 286. Achenium of Buttercup. 287. Same, cut through, to show the seed within.

FIG. 288. Slice of a part of a ripe strawberry, enlarged; some of the achenia shown cut through.

FIG. 289. Slice of a part of a blackberry. 290. One of the grains or drupes divided, more enlarged; showing the flesh, the stone, and the seed, as in Fig. 285.

thin scales which fall off at the touch; in the Sneezeweed, of about five very thin scales, which look more like a calyx (Fig. 294); and in the Thistle, Aster, Sow-Thistle (Fig. 295), and hundreds of others, it is cut up into a tuft of fine bristles or hairs. This is called the *Pappus*; — a name which properly means the down like that of the Thistle; but it is applied to all these forms, and to every other under which the limb of the calyx of the "compound flowers" appears. In Lettuce, Dandelion (Fig. 296), and the like, the achenium as it matures tapers upwards into a slender beak, like a stalk to the pappus.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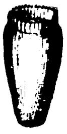
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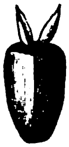
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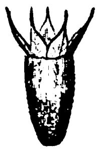
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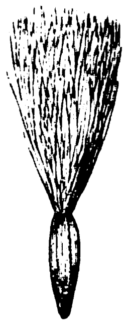
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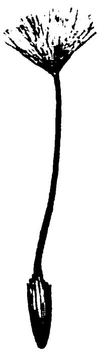
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350. **A Utricle** is the same as an achenium, but with a thin and bladdery loose pericarp; like that of the Goosefoot or Pigweed (Fig. 297). When ripe it bursts open irregularly to discharge the seed; or sometimes it opens by a circular line all round, the upper part falling off like a lid; as in the Amaranth (Fig. 298).

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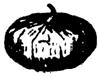
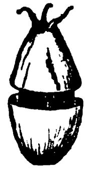


351. **A Caryopsis, or Grain,** differs from the last only in the seed adhering to the thin pericarp throughout, so that fruit and seed are incorporated into one body; as in wheat, Indian corn, and other kinds of grain.

352. **A Nut** is a dry and indehiscent fruit, commonly one-celled and one-seeded, with a hard, crustaceous, or bony wall, such as the cocoanut, hazelnut, chestnut, and the acorn (Fig. 21, 299). Here the involucre, in the form of a cup at the base, is called the *Cupule.* In the Chestnut it forms the bur; in the Hazel, a leafy husk.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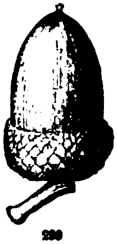
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FIG. 291. Achenium of Mayweed (no pappus). 292. That of Succory (its pappus a shallow cup). 293. Of Sunflower (pappus of two deciduous scales). 294. Of Sneezeweed (Helenium), with its pappus of five scales. 295. Of Sow-Thistle, with its pappus of delicate downy hairs. 296. Of the Dandelion, its pappus raised on a long beak.

IG. 297. Utricle of the common Pigweed (Chenopodium album).

FIG. 298. Utricle (pyxis) of Amaranth, opening all round (circumcissile).

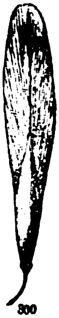
FIG. 299. Nut (acorn) of the Oak, with its cup (or cupule).

353. **A Samara, or Key-fruit,** is either a nut or an achenium, or any other indehiscent fruit, furnished with a wing, like that of the Maple (Fig. 1), Ash (Fig. 300), and Elm (Fig. 301).

354. **The Capsule, or Pod,** is the general name for dry seed-vessels which split or burst open at maturity. But several sorts of pod are distinguished by particular names. Two of them belong to simple pistils, namely, the *Follicle* and the *Legume*.

355. **The Follicle** is a fruit of a simple pistil opening along the inner suture (307). The pods of the Pæony, Columbine, Larkspur, Marsh-Marigold (Fig. 302), and Milkweed are of this kind. The seam along which the follicle opens answers to the edges of the pistil-leaf (Fig. 251, 253).

356. **The Legume** or true *Pod*, like the Pea-pod (Fig. 303), is similar to the follicle, only it opens by the outer as well as the inner or ventral suture (307), that is, by what answers to the midrib as well as by what answers to the united margins of the leaf. It splits therefore into two pieces, which are called *valves*. The legume belongs to plants of the Pulse family, which are accordingly termed *Leguminosæ*, that is, leguminous plants. So the fruits of this family keep the name of legume, whatever their form, and whether they open or not. A legume divided across into one-seeded joints, which separate when ripe, as in Tick-Trefoil (Fig. 304), is named a *Loment*.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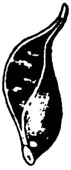
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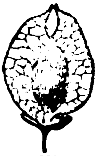
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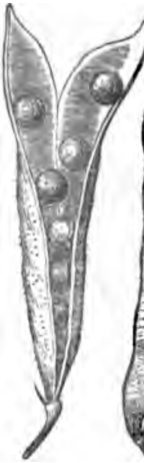
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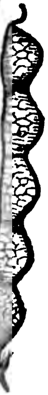
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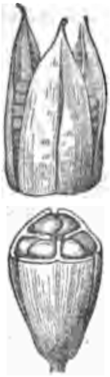
357. **The true Capsule** is the pod of a compound pistil. Like the ovary it resulted from, it may be one-celled, or it may have as many cells as there are carpels in its composition. It may discharge its seeds through chinks or pores, as in the Poppy, or burst irregularly in some part, as in Lobelia and the Snapdragon; but commonly it splits open (or is *dehiscent*) lengthwise into regular pieces, called *valves*.

FIG. 300. Samara or key of the White Ash. 301. Samara of the American Elm.
FIG. 302. Follicle of Marsh-Marigold (Caltha palustris).
FIG. 303. Legume of a Sweet Pea, opened.
FIG. 304. Loment or jointed legume of Tick-Trefoil (Desmodium).

358. *Dehiscence* of a pod resulting from a compound pistil, when regular, takes place in one of two principal ways, which are best shown in pods of two or three cells. Either the pod splits open down the middle of the back of each cell, when the dehiscence is *loculicidal*, as in Fig. 305; or it splits through the partitions, after which each cell generally opens at its inner angle, when it is *septicidal*, as in Fig. 306. These names are of Latin derivation, the first meaning "cutting into the cells"; the second, "cutting through the partitions." Of the first sort, the Lily and Iris (Fig. 305) are good examples; of the second, the Rhododendron, Azalea, and St. John's-wort. From the structure of the pistil (305 – 311) the student will readily see, that the line down the back of each cell answers to the dorsal suture of the carpel; so that the pod opens by this when loculicidal, while it separates into its component carpels, which open as follicles, when septicidal. Some pods open both ways, and so split into twice as many valves as the carpels of which they are formed.



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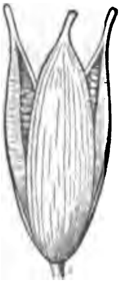

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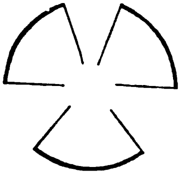
359. In loculicidal dehiscence the valves naturally bear the partitions on their middle; in the septicidal, half the thickness of a partition is borne on the margin of each valve. See the diagrams, Fig. 307 – 309. A variation of either mode sometimes occurs, as shown in the diagram, Fig. 309, where the valves break away from the partitions. This is called *septifragal* dehiscence; and may be seen in the Morning-Glory.



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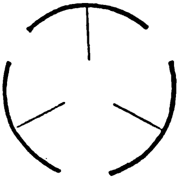

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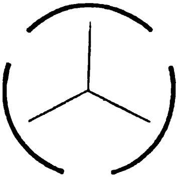

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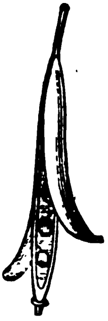
360. Three remaining sorts of pods are distinguished by proper names, viz.: —

FIG. 305. Capsule of Iris (with loculicidal dehiscence), below cut across.
FIG. 306. Pod of a Marsh St. John's-wort, with septicidal dehiscence.
FIG. 307. Diagram of septicidal; 308, of loculicidal; and 309, of septifragal dehiscence.

361. **The Silique** (Fig. 310), the peculiar pod of the Mustard family; which is two-celled by a false partition stretched across between two parietal placentæ. It generally opens by two valves from below upwards, and the placentæ with the partition are left behind when the valves fall off.

362. **A Silicle or Pouch** is only a short and broad silique, like that of the Shepherd's Purse, of the Candy-tuft, &c.

363. **The Pyxis** is a pod which opens by a circular horizontal line, the upper part forming a lid, as in Purslane (Fig. 311), the Plantain, Henbane, &c. In these the dehiscence extends all round, or is *circumcissile.* So it does in Fig. 298, which represents a sort of one-seeded pyxis. In Jeffersonia or Twin-leaf, the line does not separate quite round, but leaves a portion to form a hinge to the lid.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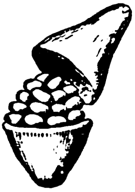
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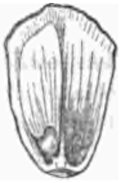
364. **Multiple or Collective Fruits** (334) are, properly speaking, masses of fruits, resulting from several or many blossoms, aggregated into one body. The pine-apple, mulberry, Osage-orange, and the fig, are fruits of this kind. This latter is a peculiar form, however, being to a mulberry nearly what a Rose-hip is to a strawberry (Fig. 279, 280), namely, with a hollow receptacle bearing the flowers concealed inside; and the whole eatable part is this pulpy common receptacle, or hollow thickened flower-stalk.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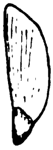
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365. **A Strobile, or Cone** (Fig. 314), is the peculiar multiple fruit of Pines, Cypresses, and the like; hence named *Coniferæ,* viz. cone-bearing plants. As already shown (322), these cones are made of *open pistils,* mostly in the form of flat scales, regularly overlying each other, and pressed together in a spike or head. Each scale bears one or two naked seeds on its inner face. When the cone is ripe and dry, the scales turn back or diverge, and the seed peels off and falls, generally carrying with it a wing, which was a part of the lining of the scale, and which facilitates the dispersion of the seeds by the wind (Fig. 312, 313). In Arbor-Vitæ, the scales

FIG. 310. Silique of Spring Cress (Cardamine rhomboidea), opening.

FIG. 311. The pyxis, or pod, of the common Purslane.

FIG. 312. Inside view of a scale from the cone of Pitch-Pine; with one of the seeds (Fig. 313) detached; the other in its place on the scale.

of the small cone are few, and not very unlike the leaves (Fig. 265). In Cypress they are very thick at the top and narrow at the base, so as to make a peculiar sort of closed cone. In Juniper and Red Cedar, the few scales of the very small cone become fleshy, and ripen into a fruit which might be taken for a berry.

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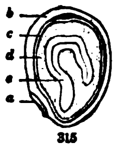
LESSON XXI.

THE SEED.

366. The ovules (323), when they have an embryo (or undeveloped plantlet, 16) formed in them, become seeds.

367. The *Seed*, like the ovule from which it originates, consists of its coats, or integuments, and a kernel.

368. **The Seed-coats** are commonly two (324), the outer and the inner. Fig. 315 shows the two, in a seed cut through lengthwise. The outer coat is often hard or crustaceous, whence it is called the *Testa*, or shell of the seed; the inner is thin and delicate.



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369. The shape and the markings, so various in different seeds, depend mostly on the outer coat. Sometimes it fits

FIG. 314. Cone of Pitch-Pine (Pinus rigida).

FIG. 315. Seed of Basswood cut through lengthwise: *a*, the hilum or scar; *b*, the outer coat; *c*, the inner; *d*, the albumen; *e*, the embryo.

the kernel closely; sometimes it is expanded into a *wing*, as in the Trumpet-Creeper (Fig. 316), and occasionally this wing is cut up into shreds or tufts, as in the Catalpa; or instead of a wing it may bear a *coma*, or tuft of long and soft hairs, such as we find in the Milkweed or Silkweed (Fig. 317). The object of wings or downy tufts is to render the seeds buoyant, so that they may be widely dispersed by the winds. This is clear, not only from their evident adaptation to this purpose, but also from the interesting fact that winged and tufted seeds are found only in fruits that split open at maturity, never in those that remain closed. The coat of some seeds is beset with long hairs or wool. *Cotton*, one of the most important vegetable products,—since it forms the principal clothing of the larger part of the human race,—consists of the long and woolly hairs which thickly cover the whole surface of the seed. Certain seeds have an additional, but more or less incomplete covering, outside of the real seed-coats, called an

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317

370. **Aril, or Arillus.** The loose and transparent bag which encloses the seed of the White Water-Lily (Fig. 318) is of this kind. So is the *mace* of the nutmeg; and also the scarlet pulp around the seeds of the Waxwork (Celastrus) and Strawberry-bush (Euonymus), so ornamental in autumn, after the pods burst. The aril is a growth from the extremity of the seed-stalk, or the placenta.

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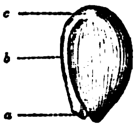
371. The names of the parts of the seed and of its kinds are the same as in the ovule. The scar left where the seed-stalk separates is called the *Hilum*. The orifice of the ovule, now closed up, and showing only a small point or mark, is named the *Micropyle*. The terms *orthotropous*, *anatropous*, &c.



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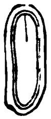

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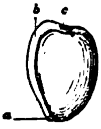

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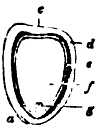

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FIG. 316. A winged seed of the Trumpet-Creeper.

FIG. 317. Seed of Milkweed, with a *coma* or tuft of long silky hairs at one end.

FIG. 318. Seed of White Water-Lily, enclosed in its aril.

FIG. 319. Seed of a Violet (anatropous): *a*, hilum; *b*, rhaphe; *c*, chalaza.

FIG. 320. Seed of a Larkspur (also anatropous); the parts lettered as in the last.

FIG. 321. The same, cut through lengthwise: *a*, the hilum; *c*, chalaza; *d*, outer seed-coat; *e*, inner seed-coat; *f*, the albumen; *g*, the minute embryo.

FIG. 322. Seed of a St. John's-wort, divided lengthwise; here the whole kernel is embryo.

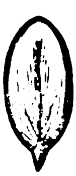
apply to seeds just as they do to ovules (325); and so do those terms which express the direction of the ovule or the seed in the cell; such as *erect*, *ascending*, *horizontal*, *pendulous*, or *suspended* (323): therefore it is not necessary to explain them anew. The accompanying figures (Fig. 319 – 322) show all the parts of the most common kind of seed, namely, the anatropous.

372. **The Kernel, or Nucleus,** is the whole body of the seed within the coats. In many seeds the kernel is all *Embryo;* in others a large part of it is the *Albumen.*

373. **The Albumen** of the seed is an accumulation of nourishing matter (starch, &c.), commonly surrounding the embryo, and destined to nourish it when it begins to grow, as was explained in the earlier Lessons (30 – 32). It is the floury part of wheat, corn (Fig. 38, 39), buckwheat, and the like. But it is not always *mealy* in texture. In Poppy-seeds it is *oily*. In the seeds of Pæony and Barberry, and in the cocoanut, it is *fleshy;* in coffee it is *corneous* (that is, hard and tough, like horn); in the Ivory Palm it has the hardness as well as the general appearance of ivory, and is now largely used as a substitute for it in the fabrication of small objects. However solid its texture, the albumen always softens and partly liquefies during germination; when a considerable portion of it is transformed into sugar, or into other forms of fluid nourishment, on which the growing embryo may feed.

374. **The Embryo,** or *Germ*, is the part to which all the rest of the seed, and also the fruit and the flower, are subservient. When the embryo is small and its parts little developed, the albumen is the more abundant, and makes up the principal bulk of the seed, as in Fig. 30, 321, 325. On the other hand, in many seeds there is no albumen at all; but the strong embryo forms the whole kernel; as in the Maple (Fig. 2, 3), Pumpkin (Fig. 9), Almond, Plum, and Apple (Fig. 11, 12), Beech (Fig. 13), and the like. Then, whatever nourishment is needed to establish the plantlet in the soil is stored up in the body of the embryo itself, mostly in its seed-leaves. And these accordingly often become very large and thick, as in the almond, bean, and pea (Fig. 16, 19), acorn (Fig. 21), chestnut, and horsechestnut (Fig. 23, 24). Besides these, Fig. 25, 26, 30 to 37, 43, and 45 exhibit various common forms of the embryo; and also some of the ways in which it is placed in the albumen; being sometimes straight, and sometimes variously coiled up or packed away.

375. The embryo, being a rudimentary plantlet, ready formed in the seed, has only to grow and develop its parts to become a young plant (15). Even in the seed these parts are generally distinguishable, and are sometimes very conspicuous; as in a Pumpkin-seed, for example (Fig. 323, 324). They are, first,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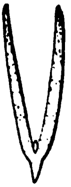
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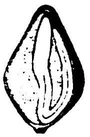
376. **The Radicle,** or rudimentary stemlet, which is sometimes long and slender, and sometimes very short, as we may see in the numerous figures already referred to. In the seed it always points to the micropyle (371), or what answers to the foramen of the ovule (Fig. 325, 326). As to its position in the fruit, it is said to be *inferior* when it points to the base of the pericarp, *superior* when it points to its summit, &c. The base or free end of the radicle gives rise to the root; the other extremity bears

377. **The Cotyledons or Seed-Leaves.** With these in various forms we have already become familiar. The number of cotyledons has also been explained to be important (32, 33). In Corn (Fig. 40), and in all Grasses, Lilies, and the like, we have a

Monocotyledonous embryo, namely, one furnished with only a single cotyledon or seed-leaf.—Nearly all the rest of our illustrations exhibit various forms of the

Dicotyledonous embryo; namely, with a pair of cotyledons or seed-leaves, always opposite each other. In the Pine family we find a

Polycotyledonous embryo (Fig. 45, 46); that is, one with several, or more than two, seed-leaves, arranged in a circle or whorl.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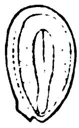
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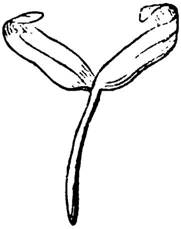
378. **The Plumule** is the little bud, or rudiment of the next leaf or pair of leaves after the seed-leaves. It appears at the summit of the radicle, between the cotyledons when there is a pair of them, as in Fig. 324, 14, 24, &c.; or the cotyledon when only one is wrapped round it, as in Indian Corn, Fig. 40. In germination the plumule develops upward, to form the ascending trunk or stem of the plant, while the other end of the radicle grows downward, and becomes the root.

FIG. 323. Embryo of the Pumpkin, seen flatwise. 324. Same cut through and viewed edgewise, enlarged; the small plumule seen between the cotyledons at their base.

FIG. 325. Seed of a Violet (Fig. 319) cut through, showing the embryo in the section, edgewise; being an *anatropous* seed, the radicle of the straight embryo points down to the base near the hilum.

FIG. 326. Similar section of the *orthotropous* seed of Buckwheat. Here the radicle points directly away from the hilum, and to the apex of the seed; also the thin cotyledons happen in this plant to be bent round into the same direction.

379. This completes the circle, and brings our vegetable history round to its starting-point in the Second Lesson; namely, The Growth of the Plant from the Seed.



LESSON XXII.

HOW PLANTS GROW.

380. A PLANT grows from the seed, and from a tiny embryo, like that of the Maple (Fig. 327), becomes perhaps a large tree, producing every year a crop of seeds, to grow in their turn in the same way. But *how* does the plant grow? A little seedling, weighing only two or three grains, often doubles its weight every week of its early growth, and in time may develop into a huge bulk, of many tons' weight of vegetable matter. How is this done? What is vegetable matter? Where did it all come from? And by what means is it increased and accumulated in plants? Such questions as these will now naturally arise in any inquiring mind; and we must try to answer them.

381. **Growth** *is the increase of a living thing in size and substance.* It appears so natural to us that plants and animals should grow, that people rarely think of it as requiring any explanation. They say that a thing is so because it grew so. Still we wish to know how the growth takes place.

382. Now, in the foregoing Lessons we explained the whole structure of the plant, with all its organs, by beginning with the seedling plantlet, and following it onward in its development through the

FIG. 327. Germinating embryo of a Maple.

whole course of vegetation (12, &c.). So, in attempting to learn how this growth took place, it will be best to adopt the same plan, and to commence with the commencement, that is, with the first formation of a plant. This may seem not so easy, because we have to begin with parts too small to be seen without a good microscope, and requiring much skill to dissect and exhibit. But it is by no means difficult to describe them; and with the aid of a few figures we may hope to make the whole matter clear.

383. The embryo in the ripe seed is already a plant in miniature, as we have learned in the Second, Third, and Twenty-first Lessons. It is already provided with stem and leaves. To learn how the plant began, therefore, we must go back to an earlier period still; namely, to the formation and

384. **Growth of the Embryo** itself. For this purpose we return to the ovule in the pistil of the flower (323). During or soon after blossoming, a cavity appears in the kernel or nucleus of the ovule (Fig. 274, *o*), lined with a delicate membrane, and so forming a closed sac, named the *embryo-sac* (*s*). In this sac or cavity, at its upper end (viz. at the end next the orifice of the ovule), appears a roundish little *vesicle* or bladder-like body (*v*), perhaps less than one thousandth of an inch in diameter. This is the embryo, or rudimentary new plant, at its very beginning. But this vesicle never becomes anything more than a grain of soft pulp, unless the ovule has been acted upon by the pollen.

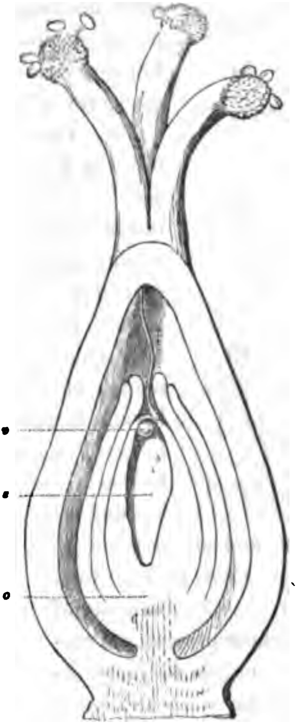


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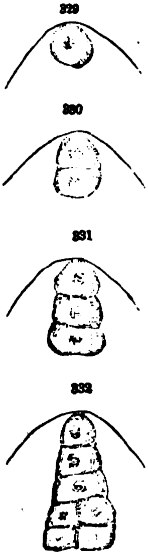
FIG. 328. Magnified pistil of Buckwheat; the ovary and ovule divided lengthwise: some pollen on the stigmas, one grain distinctly showing its tube, which penetrates the style, reappears in the cavity of the ovary, enters the mouth of the ovule (*o*), and reaches the surface of the embryo-sac (*s*), near the embryonal vesicle (*v*).

385. The pollen (297) which falls upon the stigma grows there in a peculiar way: its delicate inner coat extends into a tube (the pollen-tube), which sinks into the loose tissue of the stigma and the interior of the style, something as the root of a seedling sinks into the loose soil, reaches the cavity of the ovary, and at length penetrates the orifice of an ovule. The point of the pollen-tube reaches the surface of the embryo-sac, and in some unexplained way causes a particle of soft pulpy or mucilaginous matter (Fig. 328) to form a membranous coat and to expand into a vesicle, which is the germ of the embryo.



386. This vesicle (shown detached and more magnified in Fig. 329) is a specimen of what botanists call a *Cell*. Its wall of very delicate membrane encloses a mucilaginous liquid, in which there are often some minute grains, and commonly a larger soft mass (called its *nucleus*).

387. Growth takes place by this vesicle or cell, after enlarging to a certain size, dividing by the formation of a cross partition into two such cells, cohering together (Fig. 330); one of these into two more (Fig. 331); and these repeating the process by partitions formed in both directions (Fig. 332); forming a cluster or mass of cells, essentially like the first, and all proceeding from it. After increasing in number for some time in this way, and by a continuation of the same process, the embryo begins to shape itself; the upper end forms the radicle or root-end, while the other end shows a notch between two lobes (Fig. 333), these lobes become the cotyledons or seed-leaves, and the embryo as it exists in the seed is at length completed (Fig. 336)

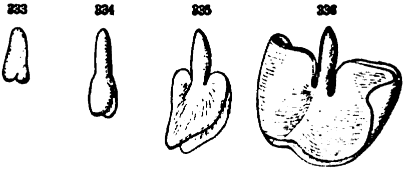
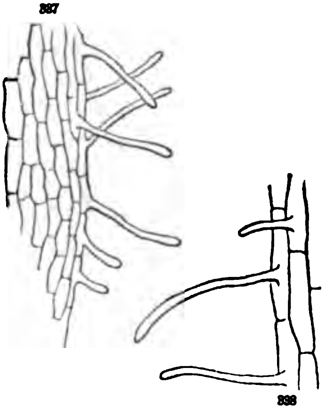


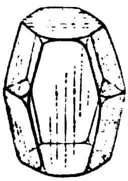
FIG. 329. Vesicle or first cell of the embryo, with a portion of the summit of the embryo-sac, detached. 330. Same, more advanced, divided into two cells. 331. Same, a little farther advanced, consisting of three cells. 332. Same, still more advanced, consisting of a little mass of young cells.

FIG. 333. Forming embryo of Buckwheat, moderately magnified, showing a nick at the end where the cotyledons are to be. 334. Same, more advanced in growth. 335. Same, still farther advanced. 336. The completed embryo, displayed and straightened out; the same as shown in a section when folded together in Fig. 326.

388. **The Growth of the Plantlet** when it springs from the seed is only a continuation of the same process. The bladder-like cells of which the embryo consists multiply in number by the repeated division of each cell into two. And the plantlet is merely the aggregation of a vastly larger number of these cells. This may be clearly ascertained by magnifying any part of a young plantlet. The young root, being more transparent than the rest, answers the purpose best. Fig. 56, on page 30, represents the end of the rootlet of Fig. 55, magnified enough to show the cells that form the surface. Fig. 337 and 338 are two small bits of the surface more highly magnified, showing the cells still larger. And if we make a thin slice through the young root both lengthwise and crosswise, and view it under a good microscope (Fig. 340), we may perceive that the whole interior is made up of just such cells. It is the same with the young stem and the leaves (Fig. 355, 357). It is essentially the same in the full-grown herb and the tree.



389. So the plant is an aggregation of countless millions of little vesicles, or cells (Fig. 339), as they are called, essentially like the cell it began with in the formation of the embryo (Fig. 329); and this first cell is the foundation of the whole structure, or the ancestor of all the rest. And a plant is a kind of structure, built up of these individual cells, something as a house is built of bricks,—only the bricks or cells are not brought to the forming plant, but are made in it and by it; or, to give a better comparison, the plant is constructed much as a honeycomb is built up of cells,—only the plant constructs itself, and shapes its own materials into fitting forms.

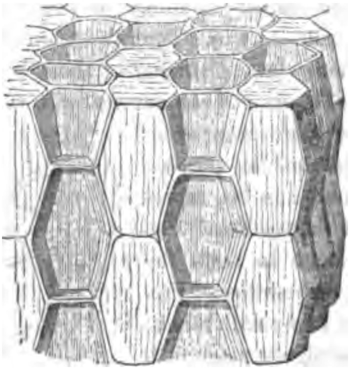


390. And vegetable growth consists of two things;—1st, the expansion of each cell until it gets its full size (which is commonly not more than $\frac{1}{400}$ of an inch in diameter); and 2d, the multiplication

FIG. 337. Tissue from the rootlet of a seedling Maple, magnified, showing root-hairs. 338. A small portion, more magnified.

FIG. 339. One cell, like those of Fig. 340, detached.

of the cells in number. It is by the latter, of course, that the principal increase of plants in bulk takes place.



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LESSON XXIII.

VEGETABLE FABRIC: CELLULAR TISSUE.

391. **Organic Structure.** A mineral — such as a crystal of spar, or a piece of marble — may be divided into smaller and still smaller pieces, and yet the minutest portion that can be seen with the microscope will have all the characters of the larger body, and be capable of still further subdivision, if we had the means of doing it, into just such particles, only of smaller size. A plant may also be divided into a number of similar parts: first into branches; then each branch or stem, into joints or similar parts (34), each with its leaf or pair of leaves. But if we divide these into pieces, the pieces are not all alike, nor have they separately the properties of the whole; they are not whole things, but fragments or slices.

392. If now, under the microscope, we subdivide a leaf, or a piece of stem or root, we come down in the same way to the set of similar things it is made of, — to cavities with closed walls, — to *Cells*, as we call them (386), essentially the same everywhere, however they may vary in shape. These are the *units*, or the elements of which every part consists; and it is their growth and their multiplication which

FIG. 340. View of a little cellular tissue of a rootlet, cut crosswise and lengthwise.

make the growth of the plant, as was shown in the last Lesson. We cannot divide them into similar smaller parts having the properties of the whole, as we may any mineral body. We may cut them in pieces; but the pieces are only mutilated parts of a cell. This is a peculiarity of organic things (2, 3): it is *organic structure*. Being composed of cells, the main structure of plants is called

393. **Cellular Tissue.** The cells, as they multiply, build up the tissues or fabric of the plant, which, as we have said (389), may be likened to a wall or an edifice built of bricks, or still better to a honeycomb composed of ranges of cells (Fig. 340).

394. The walls of the cells are united where they touch each other; and so the partition appears to be a simple membrane, although it is really double; as may be shown by boiling the tissue a few minutes and then pulling the parts asunder. And in soft fruits the cells separate in ripening, although they were perfectly united into a tissue, when green, like that of Fig 340.

395. In that figure the cells fit together perfectly, leaving no interstices, except a very small space at some of the corners. But in most leaves, the cells are loosely heaped together, leaving spaces or passages of all sizes (Fig. 356); and in the leaves and stems of aquatic and marsh plants, in particular, the cells are built up into narrow partitions, which form the sides of large and regular canals or passages (as shown in Fig. 341). These passages form the holes or cavities so conspicuous on cutting across any of these plants, and which are always filled with air. They may be likened to a stack of chimneys, built up of cells in place of bricks.

396. When small and irregular, the interstices are called *intercellular spaces* (that is, spaces between the cells). When large and regular, they are named *intercellular passages* or *air-passages*.

397. It will be noticed that in slices of the root, stem, or any tissue where the cells are not partly separate, the boundaries of the cells are usually more or less six-sided, like the cells of a honeycomb; and this is apt to be the case in whatever direction the slice is made, whether crosswise, lengthwise, or obliquely. The reason of this is easy to see. The natural figure of the cell is globular. Cells which are not pressed upon by others are generally round or roundish (except when they grow in some particular direction), as we see in the green pulp of many leaves. When a quantity of spheres (such, for instance, as a pile of cannon-balls) are heaped up, each one in the interior of the heap is touched by twelve others. If the spheres be

soft and yielding, as young cells are, when pressed together they will become twelve-sided, like that in Fig. 339. And a section in any direction will be six-sided, as are the meshes in Fig. 340.

398. The size of the common cells of plants varies from about the thirtieth to the thousandth of an inch in diameter. An ordinary size is from $\frac{1}{300}$ to $\frac{1}{500}$ of an inch; so that there may generally be from 27 to 125 millions of cells in the compass of a cubic inch!

399. Now when it is remembered that many stems shoot up at the rate of an inch or two a day, and sometimes of three or four inches, knowing the size of the cells, we may form some conception of the rapidity of their formation. The giant Puff-ball has been known to enlarge from an inch or so to nearly a foot in diameter in a single night; but much of this is probably owing to expansion. We take therefore a more decisive, but equally extraordinary case, in the huge flowering stem of the Century-Plant. After waiting many years, or even for a century, to gather strength and materials for the effort, Century-Plants in our conservatories send up a flowering stalk, which grows day after day at the rate of a foot in twenty-four hours, and becomes about six inches in diameter. This, supposing the cells to average $\frac{1}{300}$ of an inch in diameter, requires the formation of over twenty thousand millions of cells in a day!

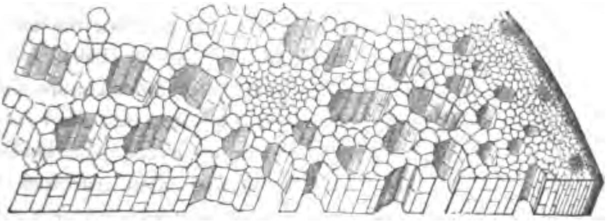
400. The walls of the cells are almost always colorless. The green color of leaves and young bark, and all the brilliant hues of flowers, are due to the contents of the cells, seen through their more or less transparent walls.

401. At first the walls are always very thin. In all soft parts they remain so; but in other cases they thicken on the inside and harden, as we see in the stone of stone-fruits, and in all hard wood (Fig. 345). Sometimes this thickening continues until the cell is nearly filled up solid.

402. The walls of cells are perfectly closed and whole, at least in all young and living cells. Those with thickened walls have thin places, indeed; but there are no holes opening from one cell into another. And yet through these closed cells the sap and all the juices are conveyed from one end of the plant to the other.

403. Vegetable cells may vary widely in shape, particularly when not combined into a tissue or solid fabric. The hairs of plants, for example, are cells drawn out into tubes, or are composed of a row of cells, growing on the surface. Cotton consists of simple long hairs on the coat of the seed; and these hairs are single cells. The hair-

like bodies which abound on young roots are very slender projections of some of the superficial cells, as is seen in Fig. 337. Even the fibres of wood, and what are called vessels in plants, are only peculiar forms or transformations of cells.



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LESSON XXIV.

VEGETABLE FABRIC: WOOD.

404. Cellular tissue, such as described in the last Lesson, makes up the whole structure of all very young plants, and the whole of Mosses and other vegetables of the lowest grade, even when full grown. But this fabric is too tender or too brittle to give needful strength and toughness for plants which are to rise to any considerable height and support themselves. So all such plants have also in their composition more or less of

405. **Wood.** This is found in all common herbs, as well as in shrubs and trees; only there is not so much of it in proportion to the softer cellular tissue. It is formed very early in the growth of the root, stem, and leaves; traces of it appearing in large embryos even while yet in the seed.

406. Wood is likewise formed of cells,—of cells which at first are just like those that form the soft parts of plants. But early in their growth, some of these lengthen and at the same time thicken their walls; these are what is called *Woody Fibre* or *Wood-Cells;* others grow to a greater size, have thin walls with various markings upon them, and often run together end to end so as to form pretty

FIG. 341. Part of a slice across the stem of the Calla Æthiopica, magnified.

large tubes, comparatively; these are called *Ducts*, or sometimes *Vessels*. Wood almost always consists of both woody fibres and ducts, variously intermingled, and combined into bundles or threads which run lengthwise through the root and stem, and are spread out to form the framework of the leaves (136). In trees and shrubs they are so numerous and crowded together, that they make a solid mass of wood. In herbs they are fewer, and often scattered. That is all the difference.

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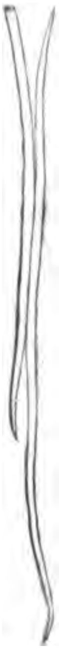

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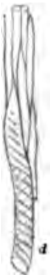

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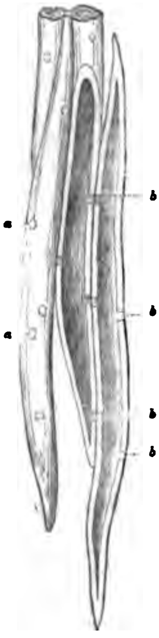

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407. The porosity of some kinds of wood, which is to be seen by the naked eye, as in mahogany and Oak-wood, is owing to a large sort of ducts. These generally contain air, except in very young parts, and in the spring of the year, when they are often gorged with sap, as we see in a wounded Grape-vine, or in the trunk of a Sugar-Maple at that time. But in woody plants through the season, the sap is usually carried up from the roots to the leaves by the

408. **Wood-Cells, or Woody Fibre.** (Fig. 342–345.) These are small tubes, commonly between one and two thousandths, but in Pine-wood sometimes two or three hundredths, of an inch in diameter. Those from the tough bark of the Basswood, shown in Fig. 342, are only the fifteen-hundredth of an inch wide. Those of Buttonwood (Fig. 345) are larger, and are here highly magnified besides. They also show the way wood-cells are commonly put together, namely, with their tapering ends overlapping each other, — spliced together, as it were, — thus giving more strength and toughness to the stem, &c.

FIG. 342. Two wood-cells from the inner or fibrous bark of the Linden or Basswood. 343. Some tissue of the wood of the same, viz. wood-cells, and below (*d*) a portion of a spirally marked duct. 344. A separate wood-cell. All equally magnified.

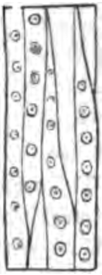
FIG. 345. Some wood-cells of Buttonwood, highly magnified: *a*, thin spots in the walls, looking like holes; on the right-hand side, where the walls are cut through, these (*b*) are seen in profile.

409. In hard woods, such as Hickory, Oak, and Buttonwood (Fig. 345), the walls of these tubes are very thick, as well as dense; while in soft woods, such as White-Pine and Basswood, they are pretty thin.

410. Wood-cells, like other cells (at least when young and living), have no openings; each has its own cavity, closed and independent. They do not form anything like a set of pipes opening one into another, so as to convey an unbroken stream of sap through the plant, in the way people generally suppose. The contents can pass from one cell to another only by getting through the partitions in some way or other. And so short are the individual wood-cells generally, that, to rise a foot in such a tree as the Basswood, the sap has to pass through about two thousand partitions!

411. But although there are no holes (except by breaking away when old), there are plenty of thin places, which look like perforations; and through these the sap is readily transferred from one cell to another, in a manner to be explained further on (487). Some of them are exhibited in Fig. 345, both as looked directly down upon, when they appear as dots or holes, and in profile where the cells are cut through. The latter view shows what they really are, namely, very thin places in the thickness of the wall; and also that a thin place in one cell exactly corresponds to one in the contiguous wall of the next cell. In the wood of the Pine family, these thin spots are much larger, and are very conspicuous in a thin slice of wood under the microscope (Fig. 346, 347);—forming stamps impressed as it were upon each fibre of every tree of this great family, by which it may be known even in the smallest fragment of its wood.

412. Wood-cells in the bark are generally longer, finer, and tougher than those of the proper wood, and appear more like fibres. For example, Fig. 344 represents a cell of the wood of Basswood, of average length, and Fig. 342 one (and part of another) of the fibrous bark, both drawn to the same scale. As these long cells form the principal part of fibrous bark, or *bast*, they are named *Bast-cells* or *Bast-fibres*. These give the great toughness to the inner bark of Basswood (i. e. Bast-wood) and of Leatherwood; and they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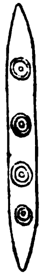
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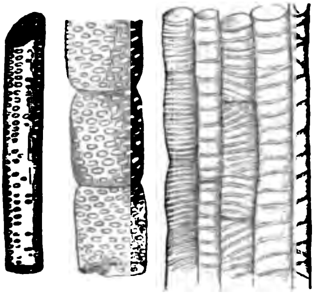
FIG. 346. A bit of Pine-shaving, highly magnified, showing the large circular thin spots of the wall of the wood-cells. 347. A separate wood-cell, more magnified, the varying thickness of the wall at these spots showing as rings.

furnish the invaluable fibres of flax and hemp; the wood of the stem being tender, brittle, and destroyed by the processes which separate for use the tough and slender bast-cells.

413. **Ducts** (Fig. 348 – 350) are larger than wood-cells, some of them having a calibre large enough to be seen by the naked eye, when cut across (407), although they are usually much too small for this. They are either long single cells, or are formed of a row of cells placed end to end. Fig. 349, a piece of a large dotted duct, and two of the ducts in Fig. 350, show this by their joints, which mark the boundaries of the several cells they are composed of.



414. The walls of ducts under the microscope display various kinds of markings. In what are called

Dotted Ducts (Fig. 348, 349), which are the commonest and the largest of all, — their cut ends making the visible porosity of Oak-wood, — the whole wall is apparently riddled with holes; but until they become old, these are only thin places.

Spiral Ducts, or *Spiral Vessels*, also the varieties of these called *Annular* or *Banded Ducts* (Fig. 350), are marked by a delicate fibre spirally coiled, or by rings or bands, thickening the wall. In the genuine spiral duct, the thread may be uncoiled, tearing the transparent wall in pieces; — as may be seen by breaking most young shoots, or the leaves of Strawberry or Amaryllis, and pulling the broken ends gently asunder, uncoiling these gossamer threads in abundance. In Fig. 355, some of these various sorts of ducts or vessels are shown in their place in the wood.

415. *Milk-Vessels*, *Turpentine-Vessels*, *Oil-Receptacles*, and the like, are generally canals or cavities formed between or among the cells, and filled with the particular products of the plant.

FIG. 348. Part of a dotted duct from a Grape-vine. 349. A similar one, evidently composed of a row of cells. 350. Part of a bundle of spiral and annular ducts from the stem of Polygonum orientale, or Princes' Feather. All highly magnified.

LESSON XXV.

ANATOMY OF THE ROOT, STEM, AND LEAVES.

416. HAVING in the last preceding Lessons learned what the materials of the vegetable fabric are, we may now briefly consider how they are put together, and how they act in carrying on the plant's operations.

417. The root and the stem are so much alike in their internal structure, that a description of the anatomy of the latter will answer for the former also.

418. **The Structure of the Rootlets**, however, or the tip of the root, demands a moment's attention. The tip of the root is the newest part, and is constantly renewing itself so long as the plant is active (67). It is shown magnified in Fig. 56, and is the same in all rootlets as in the first root of the seedling. The new roots, or their new parts, are mainly concerned in imbibing moisture from the ground; and the newer they are, the more actively do they absorb. The absorbing ends of roots are entirely composed of soft, new, and very thin-walled cellular tissue; it is only farther back that some wood-cells and ducts are found. The moisture (and probably also air) presented to them is absorbed through the delicate walls, which, like those of the cells in the interior, are destitute of openings or pores visible even under the highest possible magnifying power.

419. But as the rootlet grows older, the cells of its external layer harden their walls, and form a sort of skin, or *epidermis* (like that which everywhere covers the stem and foliage above ground), which greatly checks absorption. Roots accordingly cease very actively to imbibe moisture almost as soon as they stop growing (67).

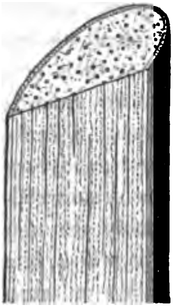
420. Many of the cells of the surface of young rootlets send out a prolongation in the form of a slender hair-like tube, closed of course at the apex, but at the base opening into the cavity of the cell. These tubes or *root-hairs* (shown in Fig. 55 and 56, and a few of them, more magnified, in Fig. 337 and 338), sent out in all directions into the soil, vastly increase the amount of absorbing surface which the root presents to it.

421. **Structure of the Stem** (also of the body of the root). At the beginning, when the root and stem spring from the seed, they consist

almost entirely of soft and tender cellular tissue. But as they grow, wood begins at once to be formed in them.

422. This woody material is arranged in the stem in two very different ways in different plants, making two sorts of wood. One sort we see in a Palm-stem, a rattan, and a Corn-stalk (Fig. 351); the other we are familiar with in Oak, Maple, and all our common kinds of wood. In the first, the wood is made up of separate threads, scattered here and there throughout the whole diameter of the stem. In the second the wood is all collected to form a layer (in a slice across appearing as a ring) of wood, between a central cellular part which has none in it, the *Pith*, and an outer cellular part, the *Bark*. This last is the plan of all our Northern trees and shrubs, and of the greater part of our herbs. The first kind is

423. **The Endogenous Stem**; so named from two Greek words meaning "inside-growing," because, when it lasts from year to year, the new wood which is added is interspersed among the older threads of wood, and in old stems the hardest and oldest wood is near the surface, and the youngest and softest towards the centre. All the plants represented in Fig. 47, on p. 19, (except the anomalous Cycas,) are examples of Endogenous stems. And all such belong to plants with only one cotyledon or seed-leaf to the embryo (32). Botanists therefore call them *Endogenous* or *Monocotyledonous Plants*, using sometimes one name, and sometimes the other. Endogenous stems have no separate pith in the centre, no distinct bark, and no layer or ring of wood between these two; but the threads of wood are scattered throughout the whole, without any particular order. This is very different from



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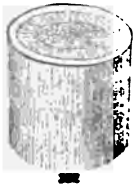
424. **The Exogenous Stem**, the one we have most to do with, since all our Northern trees and shrubs are constructed on this plan. It belongs to all plants which have two cotyledons to the embryo (or more than two, such as Pines, 33); so that we call these either *Exogenous* or *Dicotyledonous Plants* (16), accordingly as we take the name from the stem or from the embryo.

425. In the Exogenous stem, as already stated, the wood is all collected into one zone, surrounding a pith of pure cellular tissue in the centre, and surrounded by a distinct and separable bark, the

FIG. 351. Section of a Corn-stalk (an endogenous stem), both crosswise and lengthwise.

outer part of which is also cellular. This structure is very familiar in common wood. It is really just the same in the stem of an herb, only the wood is much less in quantity. Compare, for instance, a cross-section of the stem of Flax (Fig. 352) with that of a shoot of Maple or Horsechestnut of the same age. In an herb, the wood at the beginning consists of separate threads or little wedges of wood; but these, however few and scattered they may be, are all so placed in the stem as to mark out a zone (or in the cross-section a ring) of wood, dividing the pith within from the bark without.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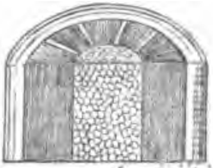
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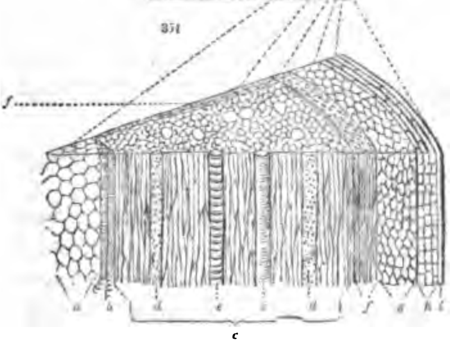

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426. The accompanying figures (which are diagrams rather than exact delineations) may serve to illustrate the anatomy of a woody exogenous stem, of one year old. The parts are explained in the references below. In the centre is the *Pith*. Surrounding this is the layer of *Wood*, consisting both of wood-cells and of ducts or vessels. From the pith to the bark on all sides run a set of narrow plates of cellular tissue, called *Medullary Rays:* these make the *silver-grain* of wood. On the cross-section they appear merely as narrow lines; but in wood cut lengthwise parallel to them, their faces show as glimmer-

FIG. 352. Cross-section of the stem of Flax, showing its bark, wood, and pith.

FIG. 353. Piece of a stem of Soft Maple, of a year old, cut crosswise and lengthwise.

FIG. 354. A portion of the same, magnified.

FIG. 355. A small piece of the same, taken from one side, reaching from the bark to the pith, and highly magnified: *a*, a small bit of the pith; *b*, spiral ducts of what is called the *medullary sheath; c*, the wood; *d*, *d*, dotted ducts in the wood; *e*, *e*, annular ducts; *f*, the liber or inner bark; *g*, the green bark; *h*, the corky layer; *i*, the skin, or epidermis; *f*, one of the medullary rays, or plates of silver-grain, seen on the cross-section.

ing plates, giving a peculiar appearance to Oak, Maple, and other wood with large medullary rays.

427. *The Bark* covers and protects the wood. At first it is all cellular, like the pith; but soon some slender woody fibres, called bast-cells (Fig. 342), generally appear in it, next the wood, forming

The Liber, or Fibrous Bark, the inner bark; to which belongs the fine fibrous *bast* or *bass* of Basswood, and the tough and slender fibres of flax and hemp, which are spun and woven, or made into cordage. In the Birch and Beech the inner bark has few if any bast-cells in its composition.

The Cellular or Outer Bark consists of cellular tissue only. It is distinguished into two parts, an inner and an outer, viz.: —

The Green Bark, or Green Layer, which consists of tender cells, containing the same green matter as the leaves, and serving the same purpose. In the course of the first season, in woody stems, this becomes covered with

The Corky Layer, so named because it is the same substance as *cork;* common cork being the thick corky layer of the bark of the Cork-Oak, of Spain. It is this which gives to the stems or twigs of shrubs and trees the aspect and the color peculiar to each; namely, light gray in the Ash, purple in the Red Maple, red in several Dogwoods, &c. Lastly,

The Epidermis, or skin of the plant, consisting of a layer of thick-sided empty cells, covers the whole.

428. **Growth of the Stem year after year.** So much for an exogenous stem only one year old. The stems of herbs perish at the end of the season. But those of shrubs and trees make a new growth every year. It is from their mode of growth in diameter that they take the name of *exogenous,* i. e. *outside-growing.* The second year, such a stem forms a second layer of wood outside of the first; the third year, another outside of that; and so on, as long as the tree lives. So that the trunk of an exogenous tree, when cut off at the base, exhibits as many concentric rings of wood as it is years old. Over twelve hundred layers have actually been counted on the stump of an aged tree, such as the Giant Cedar or Redwood of California; and there are doubtless some trees now standing in various parts of the world which were already in existence at the beginning of the Christian era.

429. As to the bark, the green layer seldom grows much after the first season. Sometimes the corky layer grows and forms new layers, inside of the old, for a good many years, as in the Cork-Oak,

the Sweet Gum-tree, and the White and the Paper Birch. But it all dies after a while; and the continual enlargement of the wood within finally stretches it more than it can bear, and sooner or later cracks and rends it, while the weather acts powerfully upon its surface; so the older bark perishes and falls away piecemeal year by year.

430. But the inner bark, or liber, does make a new growth annually, as long as the tree lives, inside of that formed the year before, and next the surface of the wood. More commonly the liber occurs in the form of thin layers, which may be distinctly counted, as in Basswood: but this is not always the case. After the outer bark is destroyed, the older and dead layers of the inner bark are also exposed to the weather, are riven or split into fragments, and fall away in succession. In many trees the bark acquires a considerable thickness on old trunks, although all except the innermost portion is dead; in others it falls off more rapidly; in the stems of Honeysuckles and Grape-vines, the bark all separates and hangs in loose shreds when only a year or two old.

431. **Sap-wood.** In the wood, on the contrary, — owing to its growing on the outside alone, — the older layers are quietly buried under the newer ones, and protected by them from all disturbance. All the wood of the young sapling may be alive, and all its cells or woody tubes active in carrying up the sap from the roots to the leaves. It is all *Sap-wood* or *Alburnum*, as young and fresh wood is called. But the older layers, removed a step farther every year from the region of growth, — or rather the zone of growth every year removed a step farther from them, — soon cease to bear much, if any, part in the circulation of the tree, and probably have long before ceased to be alive. Sooner or later, according to the kind of tree, they are turned into

432. **Heart-wood**, which we know is drier, harder, more solid, and much more durable as timber, than sap-wood. It is generally of a different color, and it exhibits in different species the hue peculiar to each, such as reddish in Red-Cedar, brown in Black-Walnut, black in Ebony, &c. The change of sap-wood into heart-wood results from the thickening of the walls of the wood-cells by the deposition of hard matter, lining the tubes and diminishing their calibre; and by the deposition of a vegetable coloring-matter peculiar to each species.

433. The heart-wood, being no longer a living part, may decay,

and often does so, without the least injury to the tree, except by impairing the strength of the trunk, and so rendering it more liable to be overthrown.

434. **The Living Parts of a Tree,** of the exogenous kind, are only these: first, the rootlets at one extremity; second, the buds and leaves of the season at the other; and third, a zone consisting of the newest wood and the newest bark, connecting the rootlets with the buds or leaves, however widely separated these may be, — in the largest trees from two to four hundred feet apart. And these parts of the tree are all renewed every year. No wonder, therefore, that trees may live so long, since they annually reproduce everything that is essential to their life and growth, and since only a very small part of their bulk is alive at once. The tree survives, but nothing now living has existed long. In it, as elsewhere, life is a transitory thing, ever abandoning the *old*, and displaying itself afresh in the *new*.

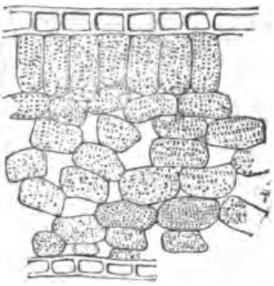
435. **Cambium-Layer.** The new growth in the stem, by which it increases in diameter year after year, is confined to a narrow line between the wood and the inner bark. *Cambium* is the old name for the mucilage which is so abundant between the bark and the wood in spring. It was supposed to be poured out there, and that the bark really separated from the wood at this time. This is not the case. The newest bark and wood are still united by a delicate tissue of young and forming cells, — called the *Cambium-layer*, — loaded with a rich mucilaginous sap, and so tender that in spring the bark may be raised from the wood by the slightest force. Here, nourished by this rich mucilage, new cells are rapidly forming by division (387 – 390); the inner ones are added to the wood, and the outer to the bark, so producing the annual layers of the two, which are ever renewing the life of the trunk.

436. At the same time new rootlets, growing in a similar way, are extending the roots beneath; and new shoots, charged with new buds, annually develop fresh crops of leaves in the air above. Only, while the additions to the wood and bark remain as a permanent portion of the tree, or until destroyed by decay, the foliage is temporary, the crop of leaves being annually thrown off after they have served their purpose.

437. **Structure of the Leaf.** Leaves also consist both of a woody and a cellular part (135). The woody part is the framework of ribs and veins, which have already been described in full (136 – 147).

They serve not only to strengthen the leaf, but also to bring in the ascending sap, and to distribute it by the veinlets throughout every part. The cellular portion is the green pulp, and is nearly the same as the green layer of the bark. So that the leaf may properly enough be regarded as a sort of expansion of the fibrous and green layers of the bark. It has of course no corky layer; but the whole is covered by a transparent skin or *epidermis*, resembling that of the stem.

438. The green pulp consists of cells of various forms, usually loosely arranged, so as to leave many irregular spaces, or air-passages, communicating with each other throughout the whole interior of the leaf (Fig. 356). The green color is owing to a peculiar green matter lying loose in the cells, in form of minute grains, named *Chlorophyll* (i. e. the green of leaves). It is this substance, seen through the transparent walls of the cells where it is accumulated, which gives the common green hue to vegetation, and especially to foliage.



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439. The green pulp in most leaves forms two principal layers; an upper one, facing the sky, and an under one, facing the ground. The upper one is always deeper green in color than the lower. This is partly owing, perhaps, to a greater amount of chlorophyll in the upper cells, but mainly to the more compact arrangement of these cells. As is seen in Fig. 356 and 357, the cells of the upper side are oblong or cylindrical, and stand endwise to the surface of the leaf, usually close together, leaving hardly any vacant spaces. Those of the lower part of the leaf are apt to be irregular in shape, most of them with their longer diameter parallel to the face of the leaf, and are very loosely arranged, leaving many and wide air-chambers. The green color underneath is therefore diluted and paler.

440. In many plants which grow where they are subject to drought, and which hold their leaves during the dry season (the Oleander for example), the greater part of the thickness of the leaf consists of layers of long cells, placed endwise and very much com-

FIG. 356. Section through the thickness of a leaf of the Star-Anise (Illicium), of Florida, magnified. The upper and the lower layers of thick-walled and empty cells represent the epidermis or skin. All those between are cells of the green pulp, containing grains of chlorophyll.

pacted, so as to expose as little surface as possible to the direct action of the hot sun. On the other hand, the leaves of marsh plants, and of others not intended to survive a drought, have their cells more loosely arranged throughout. In such leaves the epidermis, or skin, is made of only one layer of cells; while in the Oleander, and the like, it consists of three or four layers of hard and thick-walled cells. In all this, therefore, we plainly see an arrangement for tempering the action of direct sunshine, and for restraining a too copious evaporation, which would dry up and destroy the tender cells, at least when moisture is not abundantly supplied through the roots.

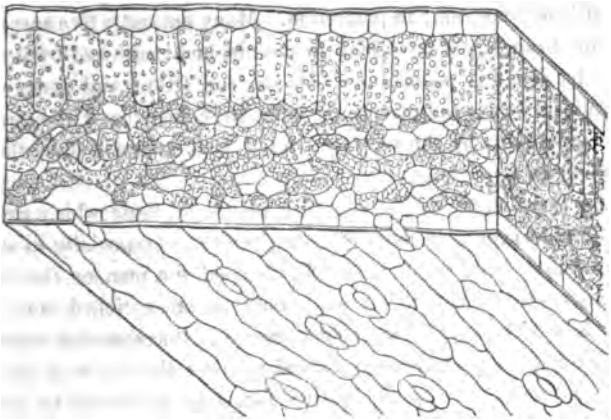
441. That the upper side of the leaf alone is so constructed as to bear the sunshine, is shown by what happens when their position is reversed: then the leaf soon twists on its stalk, so as to turn again its under surface away from the light; and when prevented from doing so, it perishes.

442. A large part of the moisture which the roots of a growing plant are constantly absorbing, after being carried up through the stem, is evaporated from the leaves. A Sunflower-plant, a little over three feet high, and with between five and six thousand square inches of surface in foliage, &c., has been found to exhale twenty or thirty ounces (between one and two pints) of water in a day. Some part of this, no doubt, flies off through the walls of the epidermis or skin, at least in sunshine and dry weather; but no considerable portion of it. The very object of this skin is to restrain evaporation. The greater part of the moisture exhaled escapes from the leaf through the

443. **Stomates or Breathing-pores.** These are small openings through the epidermis into the air-chambers, establishing a direct communication between the whole interior of the leaf and the external air. Through these the vapor of water and air can freely escape, or enter, as the case may be. The aperture is guarded by a pair of thin-walled cells, — resembling those of the green pulp within, — which open when moist so as to allow exhalation to go on, but promptly close when dry, so as to arrest it before the interior of the leaf is injured by the dryness.

444. Like the air-chambers, the breathing-pores belong mainly to the under side of the leaf. In the White Lily, — where they are unusually large, and easily seen by a simple microscope of moderate power, — there are about 60,000 to the square inch on the epidermis of the lower surface of the leaf, and only about 3,000 in

the same space of the upper surface. More commonly there are few or none on the upper side; direct sunshine evidently being unfavorable to their operation. Their immense numbers make up for their minuteness. They are said to vary from less than 1,000 to 170,000 to the square inch of surface. In the Apple-tree, where they are under the average as to number, there are about 24,000 to the square inch of the lower surface; so that each leaf has not far from 100,000 of these openings or mouths.



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LESSON XXVI.

THE PLANT IN ACTION, DOING THE WORK OF VEGETATION.

445. BEING now acquainted with the machinery of the plant, we naturally proceed to inquire what the use of it is, and how it works.

446. It has already been stated, in the first of these Lessons (7), that the great work of plants is *to change inorganic into organic matter;* that is, to take portions of earth and air,—of mineral matter,—upon which animals cannot live at all, and to convert them

FIG. 357. Portion of a White-Lily leaf, cut through and magnified, showing a section of the thickness, and also a part of the skin of the lower side, with some breathing-pores.

into something upon which they can live, namely, into food. All the food of all animals is produced by plants. Animals live upon vegetables; and vegetables live upon earth and air, principally upon the air.

447. **Plants feed upon Earth and Air.** This is evident enough from the way in which they live. Many plants will flourish in pure sand or powdered chalk, or on the bare face of a rock or wall, watered merely with rain-water. And almost any plant may be made to grow from the seed in pure sand, and increase its weight many times, even if it will not come to perfection. Many naturally live suspended from the branches of trees high in the air, and nourished by it alone, never having any connection with the soil (81); and some which naturally grow on the ground, like the Live-for-ever of the gardens, when pulled up by the roots and hung in the air will often flourish the whole summer long.

448. It is true that fast-growing plants, or those which produce considerable vegetable matter in one season, — especially in such a concentrated form as to be useful as food for man or the higher animals, — will come to maturity only in an enriched soil. But what is a rich soil? One which contains decomposing vegetable matter, or some decomposing animal matter; that is, in either case, some decomposing organic matter formerly produced by plants; aided by this, grain-bearing and other important vegetables will grow more rapidly and vigorously, and make a greater amount of nourishing matter, than they could if left to do the whole work at once from the beginning. So that in these cases also all the organic matter was made by plants, and made out of earth and air.

449. **Their Chemical Composition shows what Plants are made of.** The soil and the air in which plants live, and by which they are everywhere surrounded, supply a variety of materials, some likely to be useful to the plant, others not. To know what elements the plant makes use of, we must first know of what its fabric and its products are composed.

450. We may distinguish two sorts of materials in plants, one of which is absolutely essential, and is the same in all of them; the other not really essential, and very variable in different plants, or in the same plant under different circumstances. The former is the *organic*, the latter, the *inorganic* or *earthy* materials.

451. **The Earthy or Inorganic Constituents.** If we burn thoroughly a leaf, a piece of wood, or any other part of a vegetable, almost all of

it is dissipated into air. But a little ashes remain: these represent the earthy constituents of the plant.

452. They consist of some *potash* (or *soda* if a marine plant was used), some *silex* (the same as flint), and probably a little *lime*, *alumine*, or *magnesia*, *iron* or *manganese*, *sulphur* or *phosphorus*, &c. Some or all of these elements may be detected in many or most plants. But they make no part of their real fabric; and they form only from one or two to nine or ten parts out of a hundred of any vegetable substance. The ashes vary according to the nature of the soil. In fact, they consist, principally, of such materials as happened to be dissolved, in small quantity, in the water which was taken up by the roots; and when that is consumed by the plant, or flies off pure (as it largely does, 447) by exhalation, the earthy matter is left behind in the cells, — just as it is left incrusting the sides of a teakettle in which much hard water has been boiled. As is very natural, therefore, we find more earthy matter (i. e. more ashes) in the leaves than in any other part (sometimes as much as seven per cent, when the wood contains only two per cent); because it is through the leaves that most of the water escapes from the plant. These earthy constituents are often useful to the plant (the silex, for instance, increases the strength of the Wheat-stalk), or are useful in the plant's products as furnishing needful elements in the food of man and other animals; but they are not necessary to vegetation, which may go on without them. The really essential elements are

453. **The Organic Constituents.** As has just been remarked, when we burn in the open air a piece of any plant, nearly its whole bulk, and from 88 to more than 99 parts out of a hundred by weight of its substance, disappear, being turned into air and vapor. These are the *organic constituents* which have thus been consumed, — the actual materials of the cells and the whole real fabric of the plant. And we may state that, in burning, it has been decomposed into exactly the same kinds of air, and the vapor of water, that the plant used in its making. The burning has merely undone the work of vegetation, and given back the materials to the air just in the state in which the plant took them.

454. It will not be difficult to understand what the organic constituents, that is, what the real materials, of the plant are, and how the plant obtains them. The substance of which vegetable tissue, viz. the wall of the cells, is made, is by chemists named *Cellulose*. It is just the same thing in composition in wood and in soft cellular tis-

sue, — in the tender pot-herb and in the oldest tree. It is composed of carbon, hydrogen, and oxygen, 12 parts of the former to 10 of each of the two latter. These, accordingly, are necessary materials of vegetable growth, and must be received by the growing plant.

455. **The Plant's Food** must contain these three elements in some shape or other. Let us look for them in the materials which the plant is constantly taking from the soil and the air.

456. *Water* is the substance of which it takes in vastly more than of anything else: we well know how necessary it is to vegetable life. The plant imbibes water by the roots, which are specially constructed for taking it in, as a liquid when the soil is wet, and probably also in the form of vapor when the soil is only damp. That water in the form of vapor is absorbed by the leaves likewise, when the plant needs it, is evident from the way partly wilted leaves revive and freshen when sprinkled or placed in a moist atmosphere. Now water is composed of *hydrogen* and *oxygen*, two of the three elements of cellulose or plant-fabric. Moreover, the hydrogen and the oxygen exist in water in exactly the same proportions that they do in cellulose: so it is clear that water furnishes these two elements.

457. We inquire, therefore, after the third element, *carbon*. This is the same as pure charcoal. Charcoal is the carbon of a vegetable left behind after charring, that is, heating it out of contact of the air until the hydrogen and oxygen are driven off. The charcoal of wood is so abundant in bulk as to preserve perfectly the shape of the cells after charring, and in weight it amounts to about half that of the original material. Carbon itself is a solid, and not at all dissolved by water: as such, therefore, it cannot be absorbed into the plant, however minute the particles; only liquid and air can pass through the walls of the cells (402, 410). It must therefore come to the plant in some combination, and in a fluid form. The only substance within the plant's reach containing carbon in the proper state is

458. *Carbonic Acid.* This is a gas, and one of the components of the atmosphere, everywhere making about $\frac{1}{2500}$ part of its bulk, — enough for the food of plants, but not enough to be injurious to animals. For when mixed in any considerable proportion with the air we breathe, carbonic acid is very poisonous. The air produced by burning charcoal is carbonic acid, and we know how soon burning charcoal in a close room will destroy life.

459. The air around us consists, besides this minute proportion of carbonic acid, of two other gases, mixed together, viz. *oxygen*

and *nitrogen.* The nitrogen gas does not support animal life: it only dilutes the oxygen, which does. It is the oxygen gas alone which renders the air fit for breathing.

460. Carbonic acid consists of carbon combined with oxygen. In breathing, animals are constantly forming carbonic acid gas by uniting carbon from their bodies with oxygen of the air; they inspire oxygen into their lungs; they breath it out as carbonic acid. So with every breath animals are diminishing the oxygen of the air,— so necessary to animal life,—and are increasing its carbonic acid,— so hurtful to animal life; or rather, which would be so hurtful if it were allowed to accumulate in the air. The reason why it does not increase in the air beyond this minute proportion is that plants feed upon it. They draw their whole stock of carbon from the carbonic acid of the air.

461. Plants take it in by their leaves. Every current, or breeze that stirs the foliage, brings to every leaf a succession of fresh atoms of carbonic acid, which it absorbs through its thousands of breathing-pores. We may prove this very easily, by putting a small plant or a fresh leafy bough into a glass globe, exposed to sunshine, and having two openings, causing air mixed with a known proportion of carbonic acid gas to enter by one opening, slowly traverse the foliage, and pass out by the other into a vessel proper to receive it: now, examining the air chemically, it will be found to have less carbonic acid than before. A portion has been taken up by the foliage.

462. Plants also take it in by their roots, some probably as a gas, in the same way that leaves absorb it, and much, certainly, dissolved in the water which the rootlets imbibe. The air in the soil, especially in a rich soil, contains many times as much carbonic acid as an equal bulk of the atmosphere above. Decomposing vegetable matter or manures, in the soil, are constantly evolving carbonic acid, and a large part of it remains there, in the pores and crevices, among which the absorbing rootlets spread and ramify. Besides, as this gas is dissolved by water in a moderate degree, every rain-drop that falls from the clouds to the ground brings with it a little carbonic acid, dissolving or washing it out of the air as it passes, and bringing it down to the roots of plants. And what flows off into the streams and ponds serves for the food of water-plants.

463. So water and carbonic acid, taken in by the leaves, or taken in by the roots and carried up to the leaves as crude sap, are the general food of plants,—are the raw materials out of which at least

the fabric and a part of the general products of the plant are made. Water and carbonic acid are *mineral matters:* in the plant, mainly in the foliage, they are changed into *organic matters.* This is

464. **The Plant's proper Work, Assimilation,** viz. the conversion by the vegetable of foreign, dead, mineral matter into its own living substance, or into organic matter capable of becoming living substance. To do this is, as we have said, the peculiar office of the plant. How and where is it done?

465. *It is done in the green parts of plants alone, and only when these are acted upon by the light of the sun.* The sun in some way supplies a power which enables the living plant to originate these peculiar chemical combinations,—to organize matter into forms which are alone capable of being endowed with life. The proof of this proposition is simple; and it shows at the same time, in the simplest way, what the plant does with the water and carbonic acid it consumes. Namely, 1st, it is only in sunshine or bright daylight that the green parts of plants give out oxygen gas,—then they do; and 2d, the giving out of this oxygen gas is just what is required to render the chemical composition of water and carbonic acid the same as that of *cellulose* (454), that is, of the plant's fabric. This shows why plants spread out so large a surface of foliage.

466. In plants growing or placed under water we may see bubbles of air rising from the foliage; we may collect enough of this air to test it by a candle's burning brighter in it; which shows it to be oxygen gas. Now if the plant is making cellulose or plant-substance,—that is, is making the very materials of its fabric and growth, as must generally be the case,—all this oxygen gas given off by the leaves comes from the decomposition of carbonic acid taken in by the plant.

467. This *must be so,* because cellulose is composed of 10 parts of oxygen and 10 of hydrogen to 12 of carbon (454): here the first two are just in the same proportions as in water, which consists of one part of oxygen and one of hydrogen,—so that 10 parts of water and 12 of carbon represent one of cellulose or plant-fabric; and to make it out of water and carbonic acid, the latter (which is composed of carbon and oxygen) has only to give up all its oxygen. In other words, the plant, in its foliage under sunshine, decomposes carbonic acid gas, and turns the carbon together with water into cellulose, at the same time giving the oxygen off into the air.

468. And we can readily prove that it is so,—namely, that plants

do decompose carbonic acid in their leaves and give out its oxygen, — by the experiment mentioned in paragraph 461. There the leaves, as we have stated, are taking in carbonic acid gas. We now add, that they are giving out oxygen gas at the same rate. The air as it comes from the glass globe is found to have just as much more oxygen as it has less carbonic acid than before — just as much more oxygen as would be required to turn the carbon retained in the plant back into carbonic acid again.

469. It is all the same when plants — instead of making fabric at once, that is, growing — make the prepared material, and store it up for future use. The principal product of plants for this purpose is *Starch*, which consists of minute grains of organic matter, lying loose in the cells. Plants often accumulate this, perhaps in the root, as in the Turnip, Carrot, and Dahlia (Fig. 57 – 60); or in subterranean stems or branches, as in the Potato (Fig. 68), and many rootstocks; or in the bases of leaves, as in the Onion, Lily (Fig. 73 – 75), and other bulbs; or in fleshy leaves above ground, as those of the Ice-Plant, House-leek, and Century-Plant (Fig. 82); or in the whole thickened body, as in many Cactuses (Fig. 76); or in the seed around the embryo, as in Indian Corn (Fig. 38, 39) and other grain; or even in the embryo itself, as in the Horsechestnut (Fig. 23, 24), Bean (Fig. 16), Pea (Fig. 19), &c. In all these forms this is a provision for future growth, either of the plant itself or of some offset from it, or of its offspring, as it springs from the seed. Now starch is to cellulose or vegetable fabric just what the prepared clay is to the potter's vessel, — the same thing, only requiring to be shaped and consolidated. It has exactly the same chemical composition, and is equally made of carbon and the elements of water, by decomposing the same amount of carbonic acid and giving back its oxygen to the air. In using it for growth, the plant dissolves it, conveys it to the growing parts, and consolidates it into fabric.

470. *Sugar*, another principal vegetable product, also has essentially the same chemical composition, and may be formed out of the same common food of plants, with the same result. The different kinds of sugar (that of the cane, &c. and of grapes) consist of the same three materials as starch and cellulose, only with a little more water. The plant generally forms the sugar out of starch, changing one into the other with great ease; starch being the form in which prepared material is stored up, and sugar that in which it is ex-

pended or transferred from one part of the plant to another. In the Sugar-cane and Indian Corn, starch is deposited in the seed; in germination this is turned into sugar for the plantlet to begin its growth with; the growing plant produces more, and deposits some as starch in the stalk; just before blossoming, this is changed into sugar again, and dissolved in the sap, to form and feed the flowers (which cannot, like the leaves, create nourishment for themselves); and what is left is deposited in the seed as starch again, with which to begin the same operation in the next generation.

471. We might enumerate other vegetable products of this class (such as oil, acids, jelly, the pulp of fruits, &c.), and show how they are formed out of the carbonic acid and water which the plant takes in. But those already mentioned are sufficient. In producing any of them, carbonic acid taken from the air is decomposed, its carbon retained, and its oxygen given back to the air. That is to say,

472. **Plants purify the Air for Animals,** by taking away the carbonic acid injurious to them, continually poured into it by their breathing, as well as by the burning of fuel and by decay, and restoring in its place an equal bulk of life-sustaining oxygen (460). And by the same operation, combining this carbon with the elements of water, &c., and elaborating them into organic matter, — especially into starch, sugar, oil, and the like, —

473. **Plants produce all the Food and Fabric of Animals.** The herbivorous animals feed directly upon vegetables; and the carnivorous feed upon the herbivorous. Neither the one nor the other originate any organic matter. They take it all ready-made from plants, — altering the form and qualities more or less, and at length destroying or decomposing it.

474. Starch, sugar, and oil, for example, form a large part of the food of herbivorous animals and of man. When digested, they enter into the blood; any surplus may be stored up for a time in the form of fat, being changed a little in its nature; while the rest (and finally the whole) is decomposed into carbonic acid and water, and exhaled from the lungs in respiration; — in other words, is given back to the air by the animal as the very same materials which the plant takes from the air as its food (463); — is given back to the air in the same form that it would have been if the vegetable matter had been left to decay where it grew, or if it had been set on fire and burned; — and with the same result too as to the heat, the heat in this case producing and maintaining the proper temperature of the animal.

475. But starch, sugar, and the like, do not make any part of the flesh or fabric of animals. And that for the obvious reason, that they consist of only the three elements *carbon*, *hydrogen*, and *oxygen;* whereas the flesh of animals has nitrogen as well as these three elements in its composition. The materials of the animal body, called *Fibrine* in the flesh or muscles, *Gelatine* in the sinews and bones, *Caseine* in the curd of milk, &c., are all forms of one and the same substance, composed of *carbon*, *hydrogen*, *oxygen*, and *nitrogen*. As nitrogen is a large constituent of the atmosphere, and animals are taking it into their lungs with every breath they draw, we might suppose that they take this element of their frame directly from the air. But they do not. Even this is furnished by vegetables, and animals receive it ready-made in their food. And this brings us to consider still another and most important vegetable product, of a different class from the rest (omitted till now, for the sake of greater simplicity); namely, what is called

476. *Proteine.* This name has been given to it by chemists, because it occurs under such a protean variety of forms. The *Gluten* of wheat and the *Legumine* of beans and other leguminous plants may be taken to represent it. It occurs in all plants, at least in young and growing parts. It does not make any portion of their tissue, but is contained in all living cells, as a thin jelly, mingled with the sap or juice, or as a delicate mucilaginous lining. In fact, it is formed earlier than the cell-wall itself, and the latter is moulded on it, as it were; so it is also called *Protoplasm.* It disappears from common cells as they grow old, being transferred onward to new or forming parts, where it plays a very active part in growth. Mixed with starch, &c., it is accumulated in considerable quantity in wheat, beans, and other grains and seeds, especially those which are most nutritious as food. It is the proteine which makes them so nutritious. Taken by animals as food, it forms their flesh and sinews, and the animal part of their bones, without much change; for it has the same composition,—is just the same thing, indeed, in some slightly different forms. To produce it, the plant employs, in addition to the carbonic acid and water already mentioned as its general food, some *ammonia;* which is a compound of *hydrogen* and *nitrogen*. Ammonia (which is the same thing as hartshorn) is constantly escaping into the air in small quantities from all decomposing vegetable and animal substances. Besides, it is produced in every thunder-storm. Every flash of lightning causes some to be made (in the

form of *nitrate of ammonia*) out of the nitrogen of the air and the vapor of water. The reason why it never accumulates in the air so as to be perceptible is, that it is extremely soluble in water, as are all its compounds. So it is washed out of the atmosphere by the rain as fast as it is made or rises into it, and is brought down to the roots of plants, which take it in freely. When assimilated in the leaves along with carbon and water, proteine is formed, the very substance of the flesh of animals. So all flesh is vegetable matter in its origin.

477. Even the earthy matter of the bones, and the iron and other mineral matters in the blood of animals, are derived from the plants they feed upon, with hardly an exception. These are furnished by the earthy or mineral constituents of plants (452), and are merely accumulated in the animal frame.

478. Animals, therefore, depend absolutely upon vegetables for their being. The great object for which the All-wise Creator established the vegetable kingdom evidently is, that plants might stand on the surface of the earth between the mineral and the animal creations, and organize portions of the former for the sustenance of the latter.

LESSON XXVII.

PLANT-LIFE.

479. LIFE is known to us only by its effects. We cannot tell what it *is;* but we notice some things which it *does.* One peculiarity of living things, which has been illustrated in the last Lesson, is their power of transforming matter into new forms, and thereby making products never produced in any other way. Life is also manifested by

480. **Motion,** that is, by self-caused movements. Living things move; those not living are moved. Animals, living as they do upon organized food, — which is not found everywhere, — must needs have the power of going after it, of collecting it, or at least of taking it in; which requires them to make spontaneous movements. But plants, with their wide-spread surface (34, 131) always in con-

tact with the earth and air on which they feed, — the latter and the most important of these everywhere just the same, — have no need of locomotion, and so are generally fixed fast to the spot where they grow.

481. Yet many plants move their parts freely, sometimes when there is no occasion for it that we can understand, and sometimes accomplishing by it some useful end. The sudden closing of the leaflets of the Sensitive Plant, and the dropping of its leafstalk, when jarred, also the sudden starting forwards of the stamens of the Barberry at the touch, are familiar examples. Such cases seem at first view so strange, and so different from what we expect of a plant, that these plants are generally imagined to be endowed with a peculiar faculty, denied to common vegetables. But a closer examination will show that plants generally share in this faculty; that similar movements may be detected in them all, only — like those of the hands of a clock, or of the shadow of a sun-dial — they are too slow for the motion to be directly seen.

482. It is perfectly evident, also, that growth requires motion; that there is always an internal activity in living plants as well as in animals, — a power exerted which causes their fluids to move or circulate, and carries materials from one part to another. Some movements are mechanical; but even these are generally directed or controlled by the plant. Others must be as truly self-caused as those of animals are. Let us glance at some of the principal sorts, and see what light they throw upon vegetable life.

483. **Circulation in Cells.** From what we know of the anatomy of plants, it is clear that they have no general circulation (like that of all animals except the lowest), through a system of vessels opening into each other (402, 410). But in plants each living cell carries on a circulation of its own, at least when young and active. This may be beautifully seen in the transparent stems of Chara and many other water-plants, and in the leaves of the Fresh-water Tape-Grass (Vallisneria), under a good microscope. Here the sap circulates, often quite briskly in appearance, (but the motion is magnified as well as the objects,) in a steady stream, just beneath the wall, around each cell, passing up one side, across the end, down the other, and so round to complete the circuit, carrying with it small particles, or the larger green grains, which make the current more visible. This circulation may also be observed in hairs, particularly those on flowers, such as the jointed hairs of Spiderwort, looking

under the glass like strings of blue beads, each bead being a cell. But here a microscope magnifying six or eight hundred times in diameter is needed to see the current distinctly.

484. The movement belongs to the *protoplasm* (476), or jelly-like matter under the cell-wall. As this substance has just the same composition as the flesh of animals, it is not so strange that it should exhibit such animal-like characters. In the simplest water-plants, of the Sea-weed family, the body which answers to the seed is at first only a rounded little mass of protoplasm. When these bodies escape from the mother plant, they often swim about freely in the water in various directions, by a truly spontaneous motion, when they closely resemble animalcules, and are often mistaken for them. After enjoying this active life for several hours, they come to rest, form a covering of cellulose, and therefore become true vegetable cells, fix themselves to some support, germinate, and grow into the perfect plant.

485. **Absorption, Conveyance of the Sap, &c.** Although contained in cells with closed walls, nevertheless the fluids taken in by the roots are carried up through the stem to the leaves even of the topmost bough of the tallest tree. And the sap, after its assimilation by the leaves, is carried down in the bark or the cambium-layer, and distributed throughout the plant, or else is conveyed to the points where growth is taking place, or is accumulated in roots, stems, or wherever a deposit is being stored up for future use (71, 104, 128, 469).

486. That the rise of the sap is pretty rapid in a leafy and growing plant, on a dry summer's day, is evident from the amount of water it is continually losing by exhalation from the foliage (447); — a loss which must all the while be supplied from the roots, or else the leaves would dry up and die; as they do so promptly when separated from the stem, or when the stem is cut off from the roots. Of course they do not then lose moisture any faster than they did before the separation; only the supply is no longer kept up from below.

487. The rise of the sap into the leaves apparently is to a great degree the result of a mechanical process, which has been called *Endosmose.* It acts in this way. Whenever two fluids of different density are separated by a membrane, whether of dead or of living substance, or are separated by any porous partition, a flow takes place through the partition, mainly towards the heavier fluid, until that is brought to the same density as the other. A familiar illus-

tration is seen when we place powdered sugar upon strawberries, and slightly moisten them: the dissolving sugar makes a solution stronger than the juice in the cells of the fruit; so this is gradually drawn out. Also when pulpy fruits are boiled in a strong sirup; as soon as the sirup becomes denser than the juice in the fruit, the latter begins to flow out and the fruit begins to shrivel. But when shrivelled fruits are placed in weak sirup, or in water, they become plump, because the flow then sets inwards, the juice in the cells being denser than the water outside. Now the cells of the living plant contain organic matter, in the form of mucilage, protoplasm, sometimes sugar, &c.; and this particularly abounds in young and growing parts, such as the tips of roots (Fig. 56), which, as is well known, are the principal agents in absorbing moisture from the ground. The contents of their cells being therefore always much denser than the moisture outside (which is water containing a little carbonic acid, &c., and a very minute quantity of earthy matter), this moisture is constantly drawn into the root. What makes it ascend to the leaves?

488. To answer this question, we must look to the leaves, and consider what is going on there. For (however it may be in the spring before the leaves are out), in a leafy plant or tree the sap is not forced up from below, but is drawn up from above. Water largely evaporates from the leaves (447); it flies off into the air as vapor, leaving behind all the earthy and the organic matters, — these not being volatile; — the sap in the cells of the leaf therefore becomes denser, and so draws upon the more watery contents of the cells of the stalk, these upon those of the stem below, and so on, from cell to cell down to the root, causing a flow from the roots to the leaves, which begins in the latter, — just as a wind begins in the direction towards which it blows. Somewhat similarly, elaborated sap is drawn into buds or any growing parts, where it is consolidated into fabric, or is conveyed into tubers, roots, seeds, and the like, in which it is condensed into starch and stored up for future use (74, 103, &c.).

489. So in absorbing moisture by the roots, and in conveying the sap or the juices from cell to cell and from one part to another, the plant appears to make use of a physical or inorganic force; but it manages and directs this as the purposes of the vegetable economy demand. Now, when the proper materials are brought to the growing parts, *growth* takes place; and in growth the plant moves

the particles of matter, arranges them, and shapes the fabric in a manner which we cannot at all explain by any mechanical laws. The organs are not shaped by any external forces; they shape themselves, and take such forms and positions as the nature of each part, or the kind of plant, requires.

490. **Special Movements.** Besides growing, and quite independent of it, plants not only assume particular positions, but move or bend one part upon another to do so. Almost every species does this, as well as what are called sensitive plants. In springing from the seed, the radicle or stem of the embryo, if not in the proper position already, bends itself round so as to direct its root-end downwards, and the stem-end or plumule upwards. It does the same when covered so deeply by the soil that no light can affect it, or when growing in a perfectly dark cellar. But after reaching the light, the stem bends towards that, as every one knows; and bends towards the stronger light, when the two sides are unequally exposed to the sun. It is now known that the shoot is bent by the shortening of the cells on the more illuminated side; for if we split the bending shoot in two, that side curves over still more, while the opposite side inclines to fly back. But how the light causes the cells to shorten on that side, we can no more explain, than we can tell how the will, acting through the nerves, causes the contraction of the fibres of the muscles by which a man bends his arm. We are sure that the bending of the shoot has nothing to do with growth, because it takes place after a shoot is grown; and the delicate stem of a young seedling will bend a thousand times faster than it grows. Also because it is yellow light that most favors growth and the formation of vegetable fabric, while the blue and violet rays produce the bending. Leaves also move, even more freely than stems. They constantly present their upper face to the light; and when turned upside down, they twist on their stalks, or curve round to recover their original position.

491. Many leaves make other and quicker movements, as is seen in what has been called the *sleep of plants*. That is, they change their position as night draws on, and in different ways, according to the species, — the Locust and Wood-Sorrel turning down their leaflets, the Honey Locust raising them upright, the Sensitive Plant turning them forwards one over another; and the next morning they resume their diurnal position. One fact, among others, showing that the changes are not *caused* by the light, but by some power in the plant

itself, is this. The leaves of the Sensitive Plant close long before sunset; but they expand again before sunrise, under much less light than they had when they closed. Besides, in this as in many other plants, the leaves take the nocturnal position when brushed or jarred, — in the common Sensitive Plant very suddenly, in other sorts less quickly, in the Honey Locust a little too slowly for us to see the motion. The way in which blossoms open and close, some when the light increases and others when it diminishes, illustrates the same thing.

492. The stamens of the Barberry, when touched at the base on the inner side, — as by an insect seeking for honey, or by the point of a pin, — make a sudden jerk forward, and in the process commonly throw some pollen upon the stigma, which stands a little above their reach. In many blossoms, the stamens just at the proper season slowly approach the stigma, and after shedding their pollen recede or wither away. In such cases we plainly perceive that a useful end is subserved. But what shall we say of the Venus's Fly-trap of North Carolina, growing where it is always sure of all the food a plant can need, yet provided with an apparatus for catching insects, and for no other special use that we know of, and actually capturing them expertly by a sudden motion, in the manner already described (126, Fig. 81)? Or of the leaflets of the Desmodium gyrans of the East Indies, or one of the petals of some Orchideous flowers, moving spontaneously in a wide sweep, falling and rising by turns every few seconds for nearly the whole day long? We can only say, that plants are alive, no less than animals, and that it is a characteristic of living things to move.

⁂ CRYPTOGAMOUS OR FLOWERLESS PLANTS.

493. IN all the foregoing Lessons, we have had what may be called plants of the higher classes alone in view. There are others, composing the lower grades of vegetation, to which some allusion ought to be made.

494. Of this sort are Ferns or Brakes, Mosses, Liverworts, Lichens, Sea-weeds, and Fungi or Mushrooms. They are all classed together under the name of *Flowerless Plants*, or *Cryptogamous Plants;* the former epithet referring to the fact that they do not bear real *blossoms* (with stamens and pistils) nor *seeds* (with an embryo ready-formed within). The latter name means "hidden fructification," and intimates that they may have something answering to stamens and pistils, although not the same; and this is now known to be the case with most of them.

495. Flowerless plants are so very various, and so peculiar in each family, that a volume would be required to illustrate them. Curious and attractive as they are, they are too difficult to be studied botanically by the beginner, except the Ferns, Club-Mosses, and Horsetails. For the study of these, as well as of the Mosses (which are more difficult, and more microscopic), we refer the student at once to the *Manual of the Botany of the Northern United States*, where the species of this country are described and illustrated. The structure and physiology of these plants, as well as of the still lower grades of Lichens, Sea-weeds, and Fungi, are explained in the *Botanical Text-Book*, and in other similar works. When the student has become prepared for the study, nothing can be more interesting than these plants of the lowest orders.

LESSON XXVIII.

SPECIES AND KINDS.

496. UNTIL now, we have been considering plants as to their structure and their mode of life. We have, as it were, been reading the biography of an individual plant, following it from the tiny seedling up to the mature and fruit-bearing herb or tree, and learning how it grows and what it does. The botanist also considers *plants as to their relationships.*

497. Plants and animals, as is well known, have two great peculiarities: 1st, they form themselves; and 2d, they multiply themselves. They reproduce themselves in a continued succession of

498. **Individuals** (3). Mineral things occur as *masses*, which are divisible into smaller and still smaller ones without alteration of their properties (391). But organic things (vegetables and animals) exist as *individual beings.* Each owes its existence to a parent, and produces similar individuals in its turn. So each individual is a link of a chain; and to this chain the natural-historian applies the name of

499. **Species.** All the descendants from the same stock therefore compose one species. And it was from our observing that the several sorts of plants or animals steadily reproduce themselves,—or, in other words, keep up a succession of similar individuals,—that the idea of species originated. So we are led to conclude that the Creator established a definite number of species at the beginning, which have continued by propagation, each after its kind.

500. There are few species, however, in which man has actually observed the succession for many generations. It could seldom be proved that all the White Pine trees or White Oaks of any forest came from the same stock. But observation having familiarized us with the general fact, that individuals proceeding from the same stock are essentially alike, we infer from their close resemblance that these similar individuals belong to the same species. That is, we infer it when the individuals are as much like each other as those are which we know to have sprung from the same stock.

501. We do not infer it from every resemblance; for there is the resemblance of *kind*,—as between the White Oak and the Red Oak,

and between the latter and the Scarlet Oak: these, we take for granted, have not originated from one and the same stock, but from three separate stocks. Nor do we deny it on account of every difference; for even the sheep of the same flock, and the plants raised from peas of the same pod, may show differences, and such differences occasionally get to be very striking. When they are pretty well marked, we call them

Varieties. The White Oak, for example, presents two or three varieties in the shape of the leaves, although they may be all alike upon each particular tree. The question often arises, practically, and it is often hard to answer, whether the difference in a particular case is that of a variety, or is specific. If the former, we may commonly prove it to be so by finding such intermediate degrees of difference in various individuals as to show that no clear line of distinction can be drawn between them; or else by observing the variety to vary back again, if not in the same individual, yet in its offspring. Our sorts of Apples, Pears, Potatoes, and the like, show us that differences which are permanent in the individual, and continue unchanged through a long series of generations when propagated by division (as by offsets, cuttings, grafts, bulbs, tubers, &c.), are not likely to be reproduced by seed. Still they sometimes are so: and such varieties are called

Races. These are strongly marked varieties, capable of being propagated by seed. Our different sorts of Wheat, Indian Corn, Peas, Radishes, &c., are familiar examples: and the races of men offer an analogous instance.

502. It should be noted, that all varieties have a *tendency* to be reproduced by seed, just as all the peculiarities of the parent tend to be reproduced in the offspring. And by selecting those plants which have developed or inherited any desirable peculiarity, keeping them from mingling with their less promising brethren, and selecting again the most promising plants raised from their seeds, we may in a few generations render almost any variety transmissible by seed, so long as we take good care of it. In fact, this is the way the cultivated or domesticated races, so useful to man, have been fixed and preserved. Races, in fact, can hardly, if at all, be said to exist independently of man. But man does not really produce them. Such peculiarities — often surprising enough — now and then originate, we know not how (the plant *sports*, as the gardeners say); they are only preserved, propagated, and generally further developed, by the culti-

vator's skilful care. If left alone, they dwindle and perish, or else revert to the original form of the species.

503. Botanists variously estimate the number of known species of plants at from seventy to one hundred thousand. About 2,350 species of the higher classes of plants grow wild in the Northern United States. So that the vegetable kingdom exhibits a very great diversity. Between our largest and highest-organized trees, such as a Magnolia or an Oak, and the simplest of plants, reduced to a single cell or sphere, much too minute to be visible to the naked eye, how wide the difference! Yet the extremes are connected by intermediate grades of every sort, so as to leave no wide gap at any place; and not only so, but every grade, from the most complex to the most simple, is exhibited under a wide and most beautiful diversity of forms, all based upon the one plan of vegetation which we have been studying, and so connected and so answering to each other throughout as to convince the thoughtful botanist that all are parts of one system, works of one hand, realizations in nature of the conception of One Mind. We perceive this, also, by the way in which the species are grouped into

504. **Kinds.** If the species, when arranged according to their resemblances, were found to differ from one another about equally,—that is, if No. 1 differed from No. 2 just as much as No. 2 did from No. 3, and No. 4 from No. 5, and so on throughout,—then, with all the diversity in the vegetable kingdom there is now, there would yet be no foundation in nature for grouping species into kinds. Species and kinds would mean just the same thing. We should classify them, no doubt, for convenience, but our classification would be arbitrary. The fact is, however, that species resemble each other in very unequal degrees. Some species are almost exactly alike in their whole structure, and differ only in the shape or proportion of their parts; these, we say, belong to one *Genus*. Some, again, show a more general resemblance, and are found to have their flowers and seeds constructed on the same particular plan, but with important differences in the details; these belong to the same *Order* or *Family*. Then, taking a wider survey, we perceive that they all group themselves under a few general types (or patterns), distinguishable at once by their flowers, by their seeds or embryos, by the character of the seedling plant, by the structure of their stems and leaves, and by their general appearance: these great groups we call *Classes*. Finally, we distinguish the whole into two great types or grades;

the higher grade, of Flowering plants, exhibiting the full plan of vegetation, and the lower grade, of Flowerless plants, in which vegetation is so simplified that at length the only likeness between them and our common trees or Flowering plants is that they are both vegetables. From species, then, we rise first to

505. **Genera** (plural of *Genus*). The Rose kind or genus, the Oak genus, the Chestnut genus, &c., are familiar illustrations. Each genus is a group of nearly related species, exhibiting a particular plan. All the Oaks belong to one genus, the Chestnuts to another, the Beech to a third. The Apple, Pear, and Crab are species of one genus, the Quince represents another, the various species of Hawthorn a third. In the animal kingdom, the common cat, the wild cat, the panther, the tiger, the leopard, and the lion are species of the cat kind or genus; while the dog, the jackal, the different species of wolf, and the foxes, compose another genus. Some genera are represented by a vast number of species, others by few, very many by only one known species. For the genus may be as perfectly represented in one species as in several, although, if this were the case throughout, genera and species would of course be identical (504). The Beech genus and the Chestnut genus would be just as distinct from the Oak genus even if but one Beech and one Chestnut were known; as indeed was the case formerly.

506. **Orders or Families** (the two names are used for the same thing in botany) are groups of genera that resemble each other; that is, they are to genera what genera are to species. As familiar illustrations, the Oak, Chestnut, and Beech genera, along with the Hazel genus and the Hornbeams, all belong to one order, viz. the Oak Family; the Birches and the Alders make another family; the Poplars and Willows, another; the Walnuts (with the Butternut) and the Hickories, another. The Apple genus, the Quince and the Hawthorns, along with the Plums and Cherries and the Peach, the Raspberry, with the Blackberry, the Strawberry, the Rose, and many other genera, belong to a large order, the Rose Family.

507. **Tribes and Suborders.** This leads us to remark, that even the genera of the same order may show very unequal degrees of resemblance. Some may be very closely related to one another, and at the same time differ strikingly from the rest in certain important particulars. In the Rose Family, for example, there is the Rose genus itself, with the Raspberry genus, the Strawberry, the Cinquefoil, &c. near it, but by no means so much like it as they are like each

other: this group, therefore, answers to what is called a *Tribe;* and the Rose itself stands for another tribe. But we further observe that the Apple genus, the Hawthorns, the Quince, and the Juneberry, though of the same order, and nearly related among themselves, differ yet more widely from the Rose and its nearest relations; and so, on the other hand, do the Plum and Cherry, the Peach and the Almond. So this great Rose Family, or Order, is composed of three groups, of a more marked character than tribes, — groups which might naturally be taken for orders; and we call them *Suborders.* But students will understand these matters best after a few lessons in studying plants in a work describing the kinds.

508. **Classes.** These are great assemblages of orders, as already explained (515). The orders of Flowering Plants are numerous, no less than 134 being represented in the Botany of the Northern United States; but they all group themselves under two great classes. One class comprises all that have seeds with a monocotyledonous embryo (32), endogenous stems (423), and generally parallel-veined leaves (139); the other, those with dicotyledonous embryo, exogenous stems, and netted-veined leaves; and the whole aspect of the two is so different that they are known at a glance.

509. Finally, these two classes together compose the upper *Series* or grade of *Flowering or Phænogamous Plants,* which have their counterpart in the lower *Series* of *Flowerless or Cryptogamous Plants,* — composed of three classes, and about a dozen orders.

510. The universal members of classification are CLASS, ORDER, GENUS, SPECIES, always standing in this order. When there are more, they take their places as in the following schedule, which comprises all that are generally used in a natural classification, proceeding from the highest to the lowest, viz.: —

- Series,
  - CLASS,
    - Subclass,
      - ORDER, or FAMILY,
        - Suborder,
          - Tribe,
            - Subtribe,
              - GENUS,
                - Subgenus or Section,
                  - SPECIES,
                    - Variety.

LESSON XXIX.

BOTANICAL NAMES AND CHARACTERS.

511. PLANTS are *classified*, — i. e. are marshalled under their respective classes, orders, tribes, genera, and species, — and they are *characterized*, — that is, their principal characteristics or distinguishing marks are described or enumerated, in order that,

First, their resemblances or differences, of various degrees, may be clearly exhibited, and all the species and kinds ranked next to those they are most related to; — and

Secondly, that students may readily ascertain the botanical names of the plants they meet with, and learn their peculiarities, properties, and place in the system.

512. It is in the latter that the young student is chiefly interested. And by his studies in this regard he is gradually led up to a higher point of view, from which he may take an intelligent survey of the whole general system of plants. But the best way for the student to learn the classification of plants (or Botany as a system), is to use it, in finding out by it the name and the peculiarities of all the wild plants he meets with.

513. **Names.** The botanical name of a plant, that by which a botanist designates it, is the name of its genus followed by that of the species. The name of the genus or kind is like the family name or surname of a person, as *Smith*, or *Jones*. That of the species answers to the baptismal name, as *John*, or *James*. Accordingly, the White Oak is called botanically *Quercus alba;* the first word, or *Quercus*, being the name of the Oak genus; the second, *alba*, that of this particular species. And the Red Oak is named *Quercus rubra;* the Black-Jack Oak, *Quercus nigra;* and so on. The botanical names are all in Latin (or are Latinized), this being the common language of science everywhere; and according to the usage of that language, and of most others, the name of the species comes after that of the genus, while in English it comes before it.

514. **Generic Names.** A plant, then, is named by two words. The generic name, or that of the genus, is one word, and a substantive. Commonly it is the old classical name, when the genus was known to the Greeks and Romans; as *Quercus* for the Oak, *Fagus* for the

Beech, *Córylus*, the Hazel, and the like. But as more genera became known, botanists had new names to make or borrow. Many are named from some appearance or property of the flowers, leaves, or other parts of the plant. To take a few examples from the early pages of the *Manual of the Botany of the Northern United States*,— in which the derivation of the generic names is explained. The genus *Hepatica*, p. 6, comes from the shape of the leaf resembling that of the liver. *Myosurus*, p. 10, means mouse-tail. *Delphinium*, p. 12, is from delphin, a dolphin, and alludes to the shape of the flower, which was thought to resemble the classical figures of the dolphin. *Zanthorhiza*, p. 13, is from two Greek words meaning yellow-root, the common name of the plant. *Cimicifuga*, p. 14, is formed of two Latin words, meaning, to drive away bugs, the same as its common name of Bugbane, the Siberian species being used to keep away such vermin. *Sanguinaria*, p. 26, is named from the blood-like color of its juice.

515. Other genera are dedicated to distinguished botanists or promoters of natural science, and bear their names: such are *Magnolia*, p. 15, which commemorates the early French botanist, Magnol, and *Jeffersonia*, p. 20, named after President Jefferson, who sent the first exploring expedition over the Rocky Mountains. Others bear the name of the discoverer of the plant in question; as, *Sarracenia*, p. 23, dedicated to Dr. Sarrazin of Quebec, who was one of the first to send our common Pitcher-plant to the botanists of Europe; and *Claytonia*, p. 65, first made known by the early Virginian botanist Clayton.

516. **Specific Names.** The name of the species is also a single word, appended to that of the genus. It is commonly an adjective, and therefore agrees with the generic name in case, gender, &c. Sometimes it relates to the country the species inhabits; as, Claytonia *Virginica*, first made known from Virginia; Sanguinaria *Canadensis*, from Canada, &c. More commonly it denotes some obvious or characteristic trait of the species; as, for example, in Sarracenia, our northern species is named *purpurea*, from the purple blossoms, while a more southern one is named *flava*, because its petals are yellow; the species of Jeffersonia is called *diphylla*, meaning two-leaved, because its leaf is divided into two leaflets. Some species are named after the discoverer, or in compliment to a botanist who has made them known; as, Magnolia *Fraseri*, named after the botanist Fraser, one of the first to find this species; Ra-

nunculus *Purshii*, p. 7, named for the botanist Pursh; and Pulsatilla *Nuttalliana*, p. 4, named in compliment to Mr. Nuttall. Such names of persons are of course written with a capital initial letter. Occasionally some old substantive name is used for the species; as Magnolia *Umbrella*, p. 16, and Ranunculus *Flammula*, p. 8. These are also written with a capital initial, and need not accord with the generic name in gender, &c.

517. The name of a variety, when it is distinct enough to require any, is made on the same plan as that of the species, and is written after it; as, Ranunculus Flammula, variety *reptans*, p. 8 (i. e. the creeping variety), and R. abortivus, variety *micranthus*, p. 9, or the small-flowered variety of this species.

518. **Names of Groups.** The names of tribes, orders, and the like, are in the plural number, and are commonly formed by prolonging the name of a genus of the group taken as a representative of it. For example, the order of which the Buttercup or Crowfoot genus, *Ranunculus*, is the representative, takes from it the name of *Ranunculaceæ* (Manual, p. 2); meaning *Plantæ Ranunculaceæ* when written out in full, that is, Ranunculaceous Plants. This order comprises several tribes; one of which, to which Ranunculus itself belongs, takes the name of *Ranunculeæ;* another, to which the genus *Clematis*, or the Virgin's-Bower, belongs, takes accordingly the name of *Clematideæ;* and so on. So the term *Rosaceæ* (meaning Rosaceous plants) is the name of the order of which the Rose (*Rosa*) is the well-known representative; and *Roseæ* is the name of the particular tribe of it which comprises the Rose.

519. A few orders are named on a somewhat different plan. The great order *Leguminosæ*, for instance (Manual, p. 88), is not named after any genus in it; but the fruit, which is a legume (356), gives the name of *Leguminous Plants*. So, likewise, the order *Umbelliferæ* (Manual, p. 148) means Umbelliferous or Umbel-bearing Plants; and the vast order *Compositæ* (Manual, p. 177) is so named because it consists of plants whose blossoms are crowded into heads of the sort which were called "compound flowers" by the old botanists (277).

520. **Characters.** The brief description, or enumeration in scientific terms of the principal distinctive marks of a species, genus, order, or other group, as given in botanical works, is called its *Character*. Thus, in the Manual, already referred to, on the first page, the character of the first great series is given; then that of

the first class, of the first subclass, and of a division under it (p. 2). Then, after the name of the order, follows its character (the *ordinal* character): under the name of each genus (as, 1. *Atragene*, p. 3) is added the *generic* character, or description of what essentially distinguishes it; and finally, following the name of each species, is the *specific* character, a succinct enumeration of the points in which it mainly differs from other species of the same genus. See, for illustration, *Atragene Americana*, p. 3, where the sentence immediately following the names is intended to characterize our species as to its difference from those of other regions.

521. Under the next genus, *Clematis* (p. 3), and generally where we have several species of a genus, the species are arranged under *sections*, and these often under *subsections*, for the student's convenience in analysis, — the character or description of a section applying to all the species under it, and therefore not having to be repeated under each species. But these details are best understood by practice, in the actual studying of plants to ascertain their name and place. And to this the student is now ready to proceed.

LESSON XXX.

HOW TO STUDY PLANTS.

522. HAVING explained, in the two preceding Lessons, the general principles of Classification, and of Botanical Names, we may now show, by a few examples, how the student is to proceed in applying them, and how the name and the place in the system of an unknown plant are to be ascertained.

523. We suppose the student to be provided with the *Manual of the Botany of the Northern United States*, which describes all our plants known to grow wild this side of the Mississippi River and north of North Carolina and Tennessee. And also to have a hand *magnifying-glass*, and, if possible, a *simple microscope*, with mounted glasses, and with a stage, holding a glass plate, on which small flowers or their parts may be laid, while they are dissected under the microscope with the points of needles (mounted in han-

dles), or divided by a sharp knife. Such a microscope is not *necessary*, except for very small flowers; but it is a great convenience at all times, and is indispensable in studying the more difficult sorts of plants.*

524. To express clearly the distinctions which botanists observe, and which furnish the best marks to know a plant by, requires a good many technical terms, or words used with a precise meaning. These, as they are met with, the student should look out in the Glossary (p. 103). The terms in common use are not so numerous as they would at first appear to be. With practice they will soon become so familiar as to give very little trouble. And the application of botanical descriptive language to the plants themselves, indicating all their varieties of form and structure, is an excellent discipline for the mind, equal, if not in some respects superior, to that of learning a classical language.

525. **Analysis of a Plant.** For the first trial we may as well take a Buttercup. Some species or other may be found in blossom at almost any part of the season, and, except in early spring, the fruit, more or less matured, may be gathered with the flowers. For a full knowledge of a plant the fruit is essential, although the name may generally be ascertained without it.

526. We wish to refer the plant first to its proper class and order, and then to its genus and species. The orders are so numerous, and so generally distinguishable only by a combination of a considerable number of marks, that the young student must find his way to them by means of an *Artificial Key*. With the plant in hand, let the student turn to page xvii of the introductory part of the *Manual*, on which this artificial key to the natural orders commences.

527. It opens with "Series I. PHÆNOGAMOUS or FLOWERING PLANTS";—to which, as it has real flowers and produces seeds, our plant plainly enough belongs. Under this are two classes.

528. We read the characters (520) or distinctive marks of Class I. DICOTYLEDONOUS or EXOGENOUS PLANTS. This class, we perceive, is known by its stem, by its leaves, by its embryo, and by the number of parts in the plan of the flower. The easiest of these for the young student to determine it by, is that of the leaves, which in this class are netted-veined (140). So they plainly are in the

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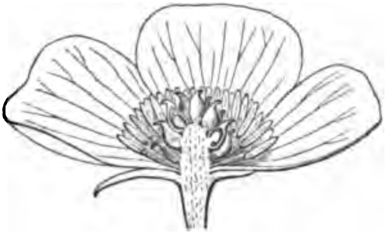
* A very good instrument of the kind, in its simplest form, is furnished by Messrs. J. & W. Grunow, opticians, of New Haven, Connecticut, for ten dollars.

Buttercup; the plan of the veins is just as in Fig. 50, only the leaf is very deeply cut, in most species. The character of the stem is not quite so easy to make out in an herb as it is in a shrub or tree. In these we see at a glance what an exogenous stem is (424–426): besides, the stem of the Buttercup is generally hollow, and so the pith is partly broken up. Still, if we make a slice near the base, and view it under a magnifying-glass, we shall find that, although herbaceous, it is formed on the same plan as that of Maple (Fig. 353) or any common wood. It is just as in Fig. 352, only there is not so much wood in it; but what there is evidently forms a ring between a pith in the centre and an outside bark; so it is exogenous. The embryo, in the seed of the Buttercup, is too minute for the student to find without considerable practice in dissecting seeds: so that character must be passed by. But the five leaves of the calyx and the five petals plainly show that the flower is constructed on the plan of five. All this agrees with Class I.; so we may be sure our plant belongs to that class.



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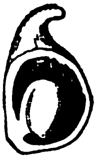
529. Under this class are two subclasses. Subclass I. ANGIOSPERMÆ, has regularly closed pistils, the ovary forming a case which includes the ovules or young seeds. To get a good view of the parts, let us with a sharp knife cut a flower directly through the middle from top to bottom; as in Fig. 358. We see it has a cluster of many pistils, heaped on an oblong receptacle: some are left whole; some are divided. One pistil, with the wall of the ovary cut away on one side, is shown, more magnified, in Fig. 359, bringing to view the single ovule it contains. The other subclass (mentioned on page xxiii) has an open scale for a pistil, bearing naked ovules, such as is shown in Fig. 264 and Fig. 266.



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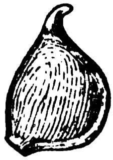

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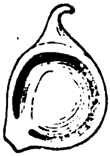

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FIG. 358. A flower of a Buttercup (Ranunculus bulbosus) cut through from top to bottom, and enlarged. 359. A pistil taken from it, and more magnified; its ovary cut through lengthwise, showing the ovule. 360. One of its pistils when ripened into a fruit (*achenium*). 361. The same, cut through, to show the seed in it.

Our plant clearly belongs to the first subclass. The second subclass comprises only Pines, Spruces, Cedars, and the like.

530. We have no less than 110 orders under this subclass. To aid the unpractised student in finding his way among them, they are ranked under three artificial divisions; the *Polypetalous*, the *Monopetalous* (page xx), and the *Apetalous* (page xxi). The flowers of the last are destitute of any corolla; those of the second have the petals more or less united into a tube or cup; the first alone has a corolla of separate petals. Our plant accordingly belongs to the POLYPETALOUS division.

531. This division comprises fifty-four orders in the Northern United States. The Artificial Key analyzes them by certain easy characters, arranged, as we perceive, under a series of headings, which lead by successive steps down to the order. The first is marked A, and has its counterparts B and C on the next page. It relates to the number of the stamens. In our plant the stamens are more numerous than the petals: so it falls under the head A.

532. The head under this, marked 1,—with its counterpart on the next page, marked 2,—relates to the calyx, whether free (269), or coherent with the ovary (271). If we have any doubt about this, the best way is to split the blossom through from top to bottom, just as in Fig. 358. Here the calyx is entirely and widely separate from the pistils; so we refer our plant to the head No. 1.

533. The next step under this is marked with a star (*), and has its alternatives on the next page, marked one with two stars, the other with three. It directs us to examine the stamens, and see whether they grow directly on the receptacle (that is, are hypogynous, 269), or are united with the base of the petals, or else are borne on the calyx. The first is plainly the case in the present instance; so we read on down the page.

534. The next line reads, "Pistils numerous, but cohering over each other on a long receptacle." In our plant they are numerous, but are entirely separate, only crowded together. We pass therefore to the next line, which reads, "Pistils several, immersed in the upper surface of a top-shaped receptacle"; which by no means accords with our plant. So we proceed to the third line, which does accord, viz.: "Pistils more than one, wholly separate and distinct." The six lines which follow this, and which are set further in, rank under it. The first two give an alternative, relating to the length of the filaments. Our plant falls under the second, the "filaments" being

"longer than the anther." Then follows an alternative, in several particulars, beginning with the anther. As our plant has two-celled anthers (294) and perfect flowers, and is an herb, we follow the second line. Under that is another alternative, beginning with the word "petals": these as well as the sepals are deciduous soon after blossoming. So we are confined to the upper of the two lines, and this brings us out to the word RANUNCULACEÆ, p. 2.

535. This is the name of the order to which our plant must belong; and the figure, 2, refers to the page of the Manual where that order is described.

536. We turn to that page, and read over the general description of the order Ranunculaceæ, especially the portion at the beginning printed in *italics*, which comprises the most important points. Its agreement with our plant shows that the key has opened the way to a right result. Under this order we find 21 genera described. A *Synopsis* gives their characters in brief, and also those of the five tribes they belong to. We compare the characters of these tribes in succession with our plant. The petals, being present and conspicuous, exclude it from the first and the second tribes; but with the third tribe, RANUNCULEÆ, it exactly accords, having the sepals overlapping each other in the bud, conspicuous petals with a little scale at their base inside, and one-seeded pistils, which form achenia or seed-like fruits (348). Under it are two genera, *Ranunculus* and *Myosurus*. With the first our plant agrees in its calyx, in its head of pistils or fruits, and in its erect seed (Fig. 361). This genus is No. 8. We turn over to where it is fully described, under that number, on page 7, and read the generic character or description, which makes it certain that our plant belongs to the genus RANUNCULUS, the *Crowfoot* or *Buttercup genus*.

537. We have now only to find out to which of the 17 species of Ranunculus our plant belongs. The color of the petals and the little scale at the base, as well as other marks, exclude it from the first section (§ 1), and lead us to § 2. Under this are two subdivisions designated by stars. The first has the "*Achenia smooth*," and takes in all the section except the last two species; our Buttercup has smooth fruits, and belongs here. Then we come to a further subdivision, marked with daggers; to the first (+–) our plant does not belong, not being *aquatic*, nor are the leaves *filiformly dissected*, i. e. cut into fine threads. It falls into the counterpart subdivision, marked +– +–, being *terrestrial*, and having a *perennial* root.

538. Under this are 13 species (from No. 3 to No. 15) arranged under three further subdivisions. The first, marked ++, having the *leaves all undivided*, does not answer. The second, marked ++ ++, will not do, having the root-leaves undivided. The third, ++ ++ ++, answers to our plant. Under it is yet a further subdivision (marked *a* and *b*): the first (*a*) does not answer, having the *petals pale and not exceeding the calyx;* the other (*b*) does answer well. This comprises four species, to one of which our plant must belong,—a comparison will soon determine which. To save labor in the comparison, some of the easiest and most certain marks are printed in italics in the description. We read the italics first, find that numbers 12, 13, and 14 are all excluded, are brought therefore to No. 15, ascertain that the whole description agrees very well, and conclude that our plant is the *Bulbous Crowfoot* or *Buttercup*, called by botanists RANUNCULUS BULBOSUS.

539. This species flowers in spring and the early part of summer, and was introduced from Europe into Eastern New England and New York, but is rarely met with in the interior of the country. Later in the season, however, another and taller species, otherwise much like it, is everywhere common in meadows and low pastures, the *Ranunculus acris*, which answers just as well for this illustration. There is also the wild Creeping Crowfoot, *Ranunculus repens* (No. 13), very common in most places; at the opening of spring the Early Crowfoot, *R. fascicularis*, makes its appearance; and several others occur in the course of the season. Having ascertained the genus from one species, the student cannot fail to recognize it again at a glance, in other species, whenever they are met with.

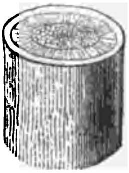
540. Returning to the species we have been occupied with, viz. *R. bulbosus*, we note the letter *L.* following the name. This stands for Linnæus, the author who first described the plant under this name. Then come the common or English names; then the specific character; after this, the station where the plant grows, and the part of the country in which it occurs. This is followed by the time of blossoming (from May to July); and then by some general descriptive remarks. The expression "Nat. from Eu." means that the species is a naturalized emigrant from Europe, and is not original to this country. These and other abbreviations used in botanical descriptions are explained in the Preface to the *Manual of Botany.*

LESSON XXXI.

HOW TO STUDY PLANTS: FURTHER ILLUSTRATIONS.

541. BEGINNERS should not be discouraged by the slow progress they will necessarily make in the first trials. By perseverance the various difficulties will soon be overcome, and each successful analysis will facilitate the next. Not only will a second species of the same genus be known at a glance, but commonly a second genus of the same order will be recognized as a relative at sight, by the family likeness. Or if the family likeness is not detected at the first view, it will be seen as the characters of the plant are studied out.

542. We will help the student along the way by one or two more examples. We will take in the first place the common cultivated Flax, which will serve our present purpose, although not truly a wild plant in this country. Turning, as before, to the Artificial Key, on p. xvii of the Introduction to the *Manual*, the student asks first, Is the plant PHÆNOGAMOUS or FLOWERING? Of course it is; the blossom, with its stamens and pistils, answers that question. Next, To which of the two classes does it belong? If we judge by the stem, we ask whether it is exogenous or endogenous (422 – 424). A section of the stem, considerably magnified, given on page 151 we may here repeat (Fig. 362); it plainly shows a ring of wood between a central pith and a bark. It is therefore exogenous. Moreover, the leaves are netted-veined, though the veins are not conspicuous. If we judge from the embryo, there will be little difficulty in dissecting a flax-seed, and in finding that almost the whole interior is occupied by an embryo with two cotyledons, much like that of an apple-seed (Fig. 11, 12); so it is dicotyledonous. If we turn to the parts of the blossom, we perceive they are five throughout (Fig. 363, 365), a number which occurs in the first class only. All these marks, or any of them which the student is able readily to verify, show that the plant belongs to Class I. DICOTYLEDONOUS or EXOGENOUS PLANTS.



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543. To which subclass, is the next inquiry. The ovary in the

FIG. 362. Section of the stem of Flax, magnified.

centre of the flower is of the ordinary sort, enclosing the ovules: so the plant belongs to Subclass I. ANGIOSPERMÆ.

544. To get a good idea of the general plan of the flower, let the student cut it through the middle lengthwise, as in Fig. 364, and

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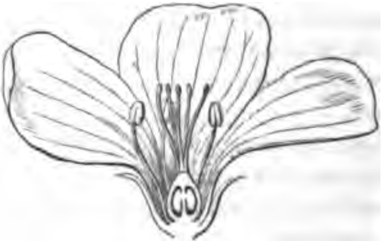

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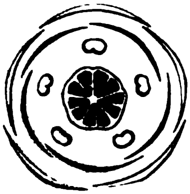
also take a slice across a flower-bud, like Fig. 365. We see that the blossom is regularly constructed upon the number five. It has a calyx of five sepals, a corolla of five petals, five stamens, and five styles, with their ovaries all combined into one compound ovary. We note, also, that the several parts of the blossom are all free and unconnected, — the leaves of the calyx, the petals, and the stamens all rising separately one after another from the receptacle underneath the ovary: that is, these parts are hypogynous (269).



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545. Continuing now our analysis by means of the Artificial Key, we perceive at a glance that our plant belongs to the first or POLYPETALOUS division, having five separate petals. Next, its stamens, being only five, exclude it from the subdivision marked A; their position alternate with the petals excludes it from B (p. xviii), but brings it under C. Under this comes the alternative between "1. *Calyx free from the ovary*," and its counterpart, 2. (at the top of p. xx), in which the tube of the calyx is adherent to the ovary. The first is the case here.

546. Under the next alternative (*) we are led to ask whether the leaves are punctate with dots, either transparent, appearing like holes when we hold up a leaf between the eye and the light

FIG. 363. Summit of a branch of the common Flax, with two flowers. 364. A flower divided lengthwise and enlarged.

FIG. 365. Cross-section of an unexpanded flower of the same, a sort of diagram.

(at least with a hand magnifying-glass), or else blackish and opaque. There are no dots; we accordingly take the alternative below, with two stars.

547. We next ask (under +–) whether the pistil or pistils are simple. There are five separate styles, but only one ovary, which, when cut across (Fig. 365) is found to be divided within by partitions into several cells. It is therefore a compound pistil (311), which excludes the plant from the section +– ; while the cells being more than one exclude it from the section +– +–, and bring it under the section +– +– +– (p. xix).

548. The next question (under ++) is, Are the flowers irregular or regular? Clearly regular (239, 244). We therefore take the subdivision marked ++ ++, and follow the analysis under it, beginning with the word "Stamens." Having five of these, and the same number of petals, our plant is excluded from the first line, and also from the second, but falls into the remaining alternative, "Stamens just as many or twice as many as the petals." Under this comes the line, "Ovules and seeds only one or two in each cell." That is the case with our plant. Furthermore, it is an herb, and accordingly falls into one of the two succeeding lines. Its perfect flowers (239), and its styles as many as the petals, exclude it from the first, and refer it to the second line. Under this are three alternatives, commencing with the word "Sepals." The second, with five sepals and petals, and the pod (more or less completely) 10-celled, alone accords with our plant, and brings us to the name of the order it belongs to, viz. LINACEÆ, described on page 70.

549. We turn to this page, and find that the plant agrees well with the brief character of the order Linaceæ, or the Flax Family; and also with that of the only genus it comprises, viz. LINUM.

550. As to the species, of course it does not agree with either of the sorts of Wild Flax; but it is barely mentioned at the end under its specific name of USITATISSIMUM, it being occasionally found spontaneous in fields where it has lately been cultivated. If we find a wild, yellow-flowered Flax with these same general characters, and having broadish leaves and distinct styles, it would be *L. Virginianum;* if with narrower and pointed leaves, and the styles partly united, *L. Boottii.*

551 After one or two analyses of this kind, the student will be able to pass rapidly over most of these steps. Suppose, for instance, a common Mallow to be the next subject. Having flowers and seeds,

it is Phænogamous. The netted-veined leaves, the structure of the stem, and the leaves of the flower in fives, at once refer it to Class I. The pistils, of the ordinary sort, refer it to Subclass I. The five petals refer it to the Polypetalous division; the numerous stamens, to subdivision A; the free calyx to the section marked 1; the stamens with the column of filaments united with the base of the petals to * * (p. xviii); and the calyx being valvate in the bud (280), the monadelphous stamens (111), and the one-celled anthers (Fig. 238), of the first line under this head, bring us to the order MALVACEÆ, described on page 65.

552. Turning to that page, we find that our plant accords with the character of the order. The synopsis which follows contains two tribes, differing in the stamens, the pistils, and the fruit. Our plant agrees with Tribe I. MALVEÆ. The stigmas bring it under the subdivision marked with one star, under which are four genera. The involucel (looking like an outer calyx) of three leaves or bractlets excludes it from the first and fourth. The petals being obcordate or strongly notched at the end exclude it from the third; while in all points it agrees with the second, viz. the genus MALVA, or true Mallow. Referring to the full description of Malva, on page 66, which confirms this conclusion, we then read over the characters of the two species there described, especially noting the more distinguishing points in Italic type, and we learn at once that our specimen belongs to the species ROTUNDIFOLIA. Its botanical name, therefore, is MALVA ROTUNDIFOLIA.

553. We will take one plant more for illustration. Let it be a sort of Morning-Glory which is often met with climbing over shrubs along the moist banks of streams. Its netted-veined leaves, the leaves of the calyx and the stamens being five, — no less than the structure of the stem, if we choose to examine it, and the embryo with two leafy cotyledons (as in Fig. 26), readily inspected if we have seeds, — show that it belongs to Class I. Its pistil refers it of course to Subclass I. The corolla being a cup or funnel-shaped tube excludes the plant from the first or Polypetalous division, and brings it under the second or Monopetalous division (page xx).

554. This division is subdivided, in the first place, by the number of the stamens, and their position as respects the lobes of the corolla. Now, as the petals of the corolla in this flower are united up to the very border, the student may at first be puzzled to tell how many lobes it should have, or, more properly, how many petals enter into

its composition. But the five leaves of the calyx would lead him to expect a corolla of five parts also. And, although there are here really no lobes or notches to be seen, yet the five plaits of the corolla answer to the notches, and prove it to consist of five petals perfectly united. Since the stamens are of the same number as the plaits of the corolla, and are placed before them (as may be best seen by splitting down the corolla on one side and spreading it out flat), it follows that they alternate with the lobes, or petals; therefore our plant belongs to the subdivision C.

555. Next, the ovary is free from the calyx; so the plant falls under the section * *, at the top of page xxi; and the regular flowers and the number of stamens bring it under the subdivision +— +—. Then our choice out of the five equivalent lines beginning with "Ovary" or "Ovaries" falls upon the third, viz. "Ovary 2–10-celled," ours being two-celled. Our plant has a style, and green herbage, referring it to the second of the next alternatives. Its five stamens borne on the corolla bring it to the third of the next set of lines; and the absence of stipules, to the second line of the next alternative; and, finally, its alternate leaves and only four-seeded pod bring us to the name of its order, viz. CONVOLVULACEÆ, p. 332.

556. Then, by the synopsis of that order, we refer the plant to the tribe CONVOLVULEÆ,—to the section with one star, and the subsection +— +— (the calyx being surrounded by two broad leafy bracts), and so to the genus, 4. CALYSTEGIA; and under that genus (p. 334) we are led to the species SEPIUM;—CALYSTEGIA SEPIUM (or *Hedge Bindweed*) being the name of our plant.

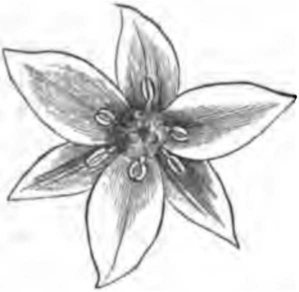
LESSON XXXII.

HOW TO STUDY PLANTS: FURTHER ILLUSTRATIONS.

557. THE foregoing illustrations have all been of the first or Exogenous class. We will take one from the other class.

558. A striking and rather common plant of our woods in spring is the Three-leaved Nightshade, or Birthroot. With specimens of this in hand, and the *Manual* before him open at the Artificial Key,

page xvii, the student, seeing at once that the plant belongs to the Phænogamous series, proceeds to determine the class. The netted-veined leaves would seem to refer the plant to the first class; while the blossom (Fig. 366, 367), constructed on the number three, naturally directs us to the second class, in which this number almost universally prevails. Here the student will be somewhat puzzled. If the seeds were ripe, they might be examined, to see whether the embryo has one cotyledon only, or a pair. But the seeds are not to be had in spring. We must judge, therefore, by the structure of the stem. Is it exogenous or endogenous? If we cut the stem through, or take off a thin slice crosswise and lengthwise, we shall perceive that the woody matter in it consists of a number of threads, interspersed throughout the soft cellular part without regularity, and not collected into a ring or layer. In fact, it is just like the Corn-stalk (Fig. 351), except that the woody threads are fewer. It is therefore *endogenous* (422); and this decides the question in favor of Class II. MONOCOTYLEDONOUS or ENDOGENOUS PLANTS (page xxiii), notwithstanding the branching veins of the leaves. For neither this character, nor the number of parts in the plan of the blossom, holds good universally, while the plan of the stem holds without exception.



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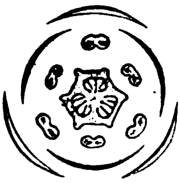

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559. The first division of this class, in the Artificial Key, is into three sections, marked A, B, and C. Our plant plainly belongs to section B, the only one in which the flowers exhibit both a calyx and a corolla.

560. Under this are two subdivisions, marked 1 and 2. The plant we are examining belongs to the second, having solitary (i. e. single) flowers. This again is subdivided into two sections, the first with a single star prefixed, the second with two stars. Having the "*perianth free from the ovary*," our plant falls into the second (page xxiv, line 2).

561. At the next step we have four subdivisions to select from, marked by daggers (+—): the three herbaceous sepals and three

FIG. 366. Flower of Trillium erectum, viewed from above. 367. Diagram of the same; a cross-section of the unopened blossom, showing the number and arrangement of parts.

colored petals refer our plant to the third, marked +– +– +–. Under this we have four lines in a row, beginning with "Pistils" or "Pistil." As our plant has a compound pistil, with three styles or stigmas, but the ovaries all united into one, which is three-celled, and with many ovules (or at length seeds) in each cell, it cannot belong to the first, which has numerous pistils; nor to the third, which has only one or two seeds in each cell; nor to the fourth, which has a one-celled ovary; but it does accord with the second line. One step only remains; which the three styles or stigmas and the three leaves in a whorl decide, directing us to TRILLIACEÆ, page 461.

562. On referring to that page, we learn that Trilliaceæ is a suborder of the order SMILACEÆ, and that it comprises two genera. Our plant accords with the first genus, TRILLIUM, which is fully characterized on p. 463.

563. We have now only to ascertain the species. The species of Trillium are arranged in two principal sections. The first (§ 1) has a sessile (i. e. stalkless) flower, with long and narrow petals. The second (§ 2) has the flower raised on a peduncle; this includes our plant. The species we have in hand has a slender and nearly erect peduncle; so it falls into the division * *; it also has sessile and abruptly pointed leaves, which bring it under the subdivision +–. The shape, size, and color of the petals, as well as the other particulars mentioned, determine the species to be T. ERECTUM.

564. The student residing west of New England will also be likely to find another species, with similar foliage, but with larger, pure white, and obovate petals, turning rose-color when about to fade. This will at once be identified as *T. grandiflorum.* And towards the north, in cold and damp woods or swamps, a smaller species will be met with, having dull-green and petioled leaves rounded at the base, and rather narrow, wavy, white petals, marked with pink or purple stripes at the base: this the student will refer to *T. erythrocarpum.* But the species principally found in the eastern parts of the country has a short peduncle recurved under the leaves, so as nearly to conceal the much less handsome, dull white flower: this belongs accordingly to the first division under § 2, and is *T. cernuum*, the *Nodding Trillium* or *Wake-Robin.*

565. Whenever the student has fairly studied out one species of a genus, he will know the others when he sees them. And when plants of another genus of the same order are met with, the order may generally be recognized at a glance, from the family resem-

blance. For instance, having first become acquainted with the Convolvulus family in the genus Calystegia (556), we recognize it at once in the common Morning-Glory, and in the Cypress-Vine, and even in the Dodder, although these belong to as many different genera. Having examined the common Mallow (552), we immediately recognize the Mallow family (*Malvaceæ*) in the Marsh-Mallow, sparingly naturalized along the coast (*Manual*, p. 66), in the Glade Mallow and the Indian Mallow (p. 67), in the Hibiscus or Rose-Mallow (p. 68), and so of the rest; because their relationship is exhibited in their general appearance, and in the whole structure of the flowers, if not of the foliage also.

566. So the study of one plant leads naturally and easily to the knowledge of the whole order or family of plants it belongs to; — which is a great advantage, and a vast saving of labor. For, although we have one hundred and thirty-four orders of Flowering Plants represented, in our Botany of the Northern States, by about 2,350 species, yet half of these species belong to nine or ten of these orders; and more than four fifths of the species belong to forty of the orders. One or two hundred species, therefore, well examined, might give a good general idea of our whole botany. And students who will patiently and thoroughly study out twenty or thirty well-chosen examples, will afterwards experience little difficulty in determining any of our Flowering Plants and Ferns, and will find the pleasure of the pursuit largely to increase with their increasing knowledge.

567. And the interest will be greatly enhanced as the student, rising to higher and wider views, begins to discern the *System* of Botany, or, in other words, comprehends more and more of *the Plan of the Creator in the Vegetable Kingdom.*

LESSON XXXIII.

BOTANICAL SYSTEMS.

568. **Natural System.** *The System* of Botany consists of the orders or families, duly arranged under their classes, and having the tribes, the genera, and the species arranged in them according to their relationships. This, when properly carried out, is the *Natural System;* because it is intended to express, as well as we are able, the various degrees of relationship among plants, as presented in nature; — to rank those species, those genera, &c. next to each other in the classification which are really most alike in all respects, or, in other words, which are constructed most nearly on the same particular plan.

569. Now this word *plan* of course supposes a *planner*, — an intelligent mind working according to a system: it is this system, therefore, which the botanist is endeavoring as far as he can to exhibit in a classification. In it we humbly attempt to learn something of the plan of the Creator in this department of Nature.

570. So there can be only *one* natural system of Botany, if by the term we mean the plan according to which the vegetable creation was called into being, with all its grades and diversities among the species, as well of past as of the present time. But there may be many natural systems, if we mean the attempts of men to interpret and express the plan of the vegetable creation, — systems which will vary with our advancing knowledge, and with the judgment and skill of different botanists, — and which must all be very imperfect. They will all bear the impress of individual minds, and be shaped by the current philosophy of the age. But the endeavor always is to make the classification a reflection of Nature, as far as any system can be which has to be expressed in a series of definite propositions, and have its divisions and subdivisions following each other in some single fixed order.*

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* The best classification must fail to give more than an imperfect and considerably distorted reflection, not merely of the plan of creation, but even of our knowledge of it. It is often obliged to make arbitrary divisions where Nature shows only transitions, and to consider genera, &c. as equal units, or groups of equally related species, while in fact they may be very unequal, — to assume, on

571. The Natural System, as we receive it, and as to that portion of it which is represented in the botany of our country, is laid before the student in the *Manual of the Botany of the Northern United States*. The orders, however, still require to be grouped, according to their natural relationships, into a considerable number of great groups (or *alliances*); but this cannot yet be done throughout in any easy way. So we have merely arranged them somewhat after a customary order, and have given, in the *Artificial Key*, a contrivance for enabling the student easily to find the natural order of any plant. This is a sort of

572. **Artificial Classification.** The object of an artificial classification is merely to furnish a convenient method of finding out the name and place of a plant. It makes no attempt at arranging plants according to their relationships, but serves as a kind of dictionary. It distributes plants according to some one peculiarity or set of peculiarities (just as a dictionary distributes words according to their first letters), disregarding all other considerations.

573. At present we need an artificial classification in Botany only as a Key to the Natural Orders, — as an aid in referring an unknown plant to its proper family; and for this it is very needful to the student. Formerly, when the orders themselves were not clearly made out, an artificial classification was required to lead the student down to the genus. Two such classifications were long in vogue. First, that of Tournefort, founded mainly on the leaves of the flower, the calyx and corolla: this was the prevalent system throughout the first half of the eighteenth century; but it has long since gone by. It was succeeded by the well-known artificial system of Linnæus, which has been used until lately; and which it is still worth while to give some account of.

574. **The Artificial System of Linnæus** was founded on the stamens and pistils. It consists of twenty-four classes, and of a variable number of orders, which were to take the place temporarily of the natural classes and orders; the genera being the same under all classifications.

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paper at least, a strictly definite limitation of genera, of tribes, and of orders, although observation shows so much blending here and there of natural groups, sufficiently distinct on the whole, as to warrant us in assuming the likelihood that the Creator's plan is one of *gradation, not of definite limitation*, except as to the species themselves.

575. The twenty-four *classes* of Linnæus were founded upon something about the stamens. The following is an analysis of them. The first great division is into two great series, the *Phænogamous* and the *Cryptogamous*, the same as in the Natural System. The first of these is divided into those flowers which have the stamens in the same flower with the pistils, and those which have not; and these again are subdivided, as is shown in the following tabular view.

Series I. PHÆNOGAMIA; plants with stamens and pistils, i. e. with real flowers.

1. Stamens in the same flower as the pistils:		
* Not united with them,		
+ Nor with one another.		
++ Of equal length if either 6 or 4 in number.		
One to each flower,	Class 1.	MONANDRIA.
Two " "	2.	DIANDRIA.
Three " "	3.	TRIANDRIA.
Four " "	4.	TETRANDRIA.
Five " "	5.	PENTANDRIA.
Six " "	6.	HEXANDRIA.
Seven " "	7.	HEPTANDRIA.
Eight " "	8.	OCTANDRIA.
Nine " "	9.	ENNEANDRIA.
Ten " "	10.	DECANDRIA.
Eleven to nineteen to each flower,	11.	DODECANDRIA.
Twenty or more inserted on the receptacle,	12.	ICOSANDRIA.
" " " on the calyx,	13.	POLYANDRIA.
++ ++ Of unequal length and either 4 or 6.		
Four, 2 long and 2 shorter,	14.	DIDYNAMIA.
Six, 4 long and 2 shorter,	15.	TETRADYNAMIA.
+ + United with each other,		
By their filaments,		
Into one set or tube,	16.	MONADELPHIA.
Into two sets,	17.	DIADELPHIA.
Into three or more sets,	18.	POLYADELPHIA.
By their anthers into a ring,	19.	SYNGENESIA.
* * United with the pistil,	20.	GYNANDRIA.
2. Stamens and pistils in separate flowers,		
Of the same individuals,	21.	MONŒCIA.
Of different individuals,	22.	DIŒCIA.
Some flowers perfect, others staminate or pistillate either in the same or in different individuals,	23.	POLYGAMIA.
Series II. CRYPTOGAMIA. No stamens and pistils, therefore no proper flowers,	24.	CRYPTOGAMIA.

576. The names of these classes are all compounded of Greek words. The first eleven consist of the Greek numerals, in succession, from 1 to 11, combined with *andria*, which here denotes stamens; — e. g. *Monandria*, with one stamen; and so on. The 11th has the numeral for twelve stamens, although it includes all which have from eleven to nineteen stamens, numbers which rarely occur. The 12th means "with twenty stamens," but takes in any higher number, although only when the stamens are borne on the calyx. The 13th means "with many stamens," but it takes only those with the stamens borne on the receptacle. The 14th means "two stamens powerful," the shorter pair being supposed to be weaker; the 15th, "four powerful," for the same reason. The names of the next three classes are compounded of *adelphia*, brotherhood, and the Greek words for *one*, *two*, and *many* (*Monadelphia*, *Diadelphia*, and *Polyadelphia*). The 19th means "united in one household." The 20th is compounded of the words for stamens and pistils united. The 21st and 22d are composed of the word meaning *house* and the numerals *one*, or single, and *two*: *Monœcia*, in one house, *Diœcia*, in two houses. The 23d is fancifully formed of the words meaning *plurality* and *marriage*, from which the English word *polygamy* is derived. The 24th is from two words meaning *concealed nuptials*, and is opposed to all the rest, which are called *Phænogamous*, because their stamens and pistils, or parts of fructification, are evident.

577. Having established the classes of his system on the stamens, Linnæus proceeded to divide them into *orders* by marks taken from the pistils, for those of the first thirteen classes. These orders depend on the number of the pistils, or rather on the number of styles, or of stigmas when there are no styles, and they are named, like the classes, by Greek numerals, prefixed to *gynia*, which means *pistil*. Thus, flowers of these thirteen classes with

One style or sessile stigma belong to			Order 1.	MONOGYNIA.
Two styles or sessile stigmas, to			2.	DIGYNIA.
Three	"	"	3.	TRIGYNIA.
Four	"	"	4.	TETRAGYNIA.
Five	"	"	5.	PENTAGYNIA.
Six	"	"	6.	HEXAGYNIA.
Seven	"	"	7.	HEPTAGYNIA.
Eight	"	"	8.	OCTOGYNIA.
Nine	"	"	9.	ENNEAGYNIA.
Ten	"	"	10.	DECAGYNIA.
Eleven or twelve		"	11.	DODECAGYNIA.
More than twelve		"	13.	POLYGYNIA.

578. The orders of the remaining classes are founded on various considerations, some on the nature of the fruit, others on the number and position of the stamens. But there is no need to enumerate them here, nor farther to illustrate the Linnæan Artificial Classification. For as a system it has gone entirely out of use; and as a Key to the Natural Orders it is not so convenient, nor by any means so certain, as a proper Artificial Key, prepared for the purpose, such as we have been using in the preceding Lessons.

LESSON XXXIV.

HOW TO COLLECT SPECIMENS AND MAKE AN HERBARIUM.

579. **For Collecting Specimens** the needful things are a large *knife*, strong enough to be used for digging up bulbs, small rootstocks, and the like, as well as for cutting woody branches; and a *botanical box*, or a *portfolio*, for holding specimens which are to be carried to any distance.

580. It is well to have both. The *botanical box* is most useful for holding specimens which are to be examined fresh. It is made of tin, in shape like a candle-box, only flatter, or the smaller sizes like an English sandwich-case; the lid opening for nearly the whole length of one side of the box. Any portable tin box of convenient size, and capable of holding specimens a foot or fifteen inches long, will answer the purpose. The box should shut close, so that the specimens may not wilt: then it will keep leafy branches and most flowers perfectly fresh for a day or two, especially if slightly moistened.

581. The *portfolio* should be a pretty strong one, from a foot to twenty inches long, and from nine to eleven inches wide, and fastening with tape, or (which is better) by a leathern strap and buckle at the side. It should contain a quantity of sheets of thin and smooth, unsized paper; the poorest printing-paper and grocers' tea-paper are very good for the purpose. The specimens as soon as gathered are to be separately laid in a folded sheet, and kept under moderate pressure in the closed portfolio.

582. Botanical specimens should be either in flower or in fruit. In the case of herbs, the same specimen will often exhibit the two; and both should by all means be secured whenever it is possible. Of small herbs, especially annuals, the whole plant, root and all, should be taken for a specimen. Of larger ones branches will suffice, with some of the leaves from near the root. Enough of the root or subterranean part of the plant should be collected to show whether the plant is an annual, biennial, or perennial. Thick roots, bulbs, tubers, or branches of specimens intended to be preserved, should be thinned with a knife, or cut into slices lengthwise.

583. **For drying Specimens** a good supply of soft and unsized paper — the more bibulous the better — is wanted; and some convenient means of applying pressure. All that is requisite to make good dried botanical specimens is, to dry them as rapidly as possible between many thicknesses of paper to absorb their moisture, under as much pressure as can be given without crushing the more delicate parts. This pressure may be given by a botanical press, of which various forms have been contrived; or by weights placed upon a board, — from forty to eighty or a hundred pounds, according to the quantity of specimens drying at the time. For use while travelling, a good portable press may be made of thick binders' boards for the sides, holding the drying paper, and the pressure may be applied by a cord, or, much better, by strong straps with buckles.

584. For drying paper, the softer and smoother sorts of cheap wrapping-paper answer very well. This paper may be made up into *driers*, each of a dozen sheets or less, according to the thickness, lightly stitched together. Specimens to be dried should be put into the press as soon as possible after gathering. If collected in a portfolio, the more delicate plants should not be disturbed, but the sheets that hold them should one by one be transferred from the portfolio to the press. Specimens brought home in the botanical box must be laid in a folded sheet of the same thin, smooth, and soft paper used in the portfolio; and these sheets are to hold the plants until they are dry. They are to be at once laid in between the driers, and the whole put under pressure. Every day (or at first even twice a day would be well) the specimens, left undisturbed in their sheets, are to be shifted into well-dried fresh driers, and the pressure renewed, while the moist sheets are spread out to dry, that they may take their turn again at the next shifting. This course must be continued until the specimens are no longer moist to the touch, —

which for most plants requires about a week; then they may be transferred to the sheets of paper in which they are to be preserved. If a great abundance of drying-paper is used, it is not necessary to change the sheets every day, after the first day or two.

585. **Herbarium.** The botanist's collection of dried specimens, ticketed with their names, place, and time of collection, and systematically arranged under their genera, orders, &c., forms a *Hortus Siccus* or *Herbarium.* It comprises not only the specimens which the proprietor has himself collected, but those which he acquires through friendly exchanges with distant botanists, or in other ways. The specimens of an herbarium may be kept in folded sheets of neat, and rather thick, white paper; or they may be fastened on half-sheets of such paper, either by slips of gummed paper, or by glue applied to the specimens themselves. Each sheet should be appropriated to one species; two or more different plants should never be attached to the same sheet. The generic and specific name of the plant should be added to the lower right-hand corner, either written on the sheet, or on a ticket pasted down at that corner; and the time of collection, the locality, the color of the flowers, and any other information which the specimens themselves do not afford, should be duly recorded upon the sheet or the ticket. The sheets of the herbarium should all be of exactly the same dimensions. The herbarium of Linnæus is on paper of the common foolscap size, about eleven inches long and seven wide. But this is too small for an herbarium of any magnitude. Sixteen and a half inches by ten and a half, or eleven and a half inches, is an approved size.

586. The sheets containing the species of each genus are to be placed in *genus-covers*, made of a full sheet of thick, colored paper (such as the strongest Manilla-hemp paper), which fold to the same dimensions as the species-sheet; and the name of the genus is to be written on one of the lower corners. These are to be arranged under the orders to which they belong, and the whole kept in closed cases or cabinets, either laid flat in compartments, like large "pigeon-holes," or else placed in thick portfolios, arranged like folio volumes, and having the names of the orders lettered on the back.

GLOSSARY

OR

DICTIONARY OF TERMS USED IN DESCRIBING PLANTS,

COMBINED WITH AN INDEX.

A, at the beginning of words of Greek derivation, commonly signifies a negative, or the absence of something; as *a*petalous, without petals; *a*phyllous, leafless, &c. If the word begins with a vowel, the prefix is *an;* as *an*antherous, destitute of anther.

Abnormal: contrary to the usual or the natural structure.

Aboriginal: original in the strictest sense; same as indigenous.

Abortive: imperfectly formed, or rudimentary, as one of the stamens in fig. 195, and three of them in fig. 196, p. 95.

Abortion: the imperfect formation, or non-formation, of some part.

Abrupt: suddenly terminating; as, for instance,

Abruptly pinnate: pinnate without an odd leaflet at the end; fig. 128, p. 65.

Acaulescent (*acaulis*): apparently stemless; the proper stem, bearing the leaves and flowers, being very short or subterranean, as in Bloodroot, and most Violets; p. 36.

Accéssory: something additional; as *Accessory buds*, p. 26.

Accrescent: growing larger after flowering, as the calyx of Physalis.

Accumbent: lying against a thing. The cotyledons are accumbent when they lie with their edges against the radicle.

Ácerose: needle-shaped, as the leaves of Pines; fig. 140, p. 72.

Acetábuliform: saucer-shaped.

Achenium (plural *achenia*): a one-seeded, seed-like fruit; fig. 286, p. 129.

Achlamýdeous (flower): without floral envelopes; as Lizard's-tail, p. 90, fig. 180.

Acicular: needle-shaped; more slender than acerose.

Acinácíform: scymitar-shaped, like some bean-pods.

Acines: the separate grains of a fruit, such as the raspberry; fig. 289.

Acorn: the nut of the Oak; fig. 299, p. 130.

Acotylédonous: destitute of cotyledons or seed-leaves.

Acrógenous: growing from the apex, as the stems of Ferns and Mosses.

Ácrogens, or *Acrogenous Plants:* the higher Cryptogamous plants, such as Ferns, &c., p. 172.

Acúleate: armed with prickles, i. e. *aculei;* as the Rose and Brier.

Acúleolate: armed with small prickles, or slightly prickly.

Acúminate: taper-pointed, as the leaf in fig. 97 and fig. 103.

Acute: merely sharp-pointed, or ending in a point less than a right angle.

Adelphous (stamens): joined in a fraternity (*adelphia*): see *monadelphous* and *diadelphous.*

Adherent: sticking to, or, more commonly, growing fast to another body; p. 104.

Adnate: growing fast to; it means born adherent. The anther is adnate when fixed by its whole length to the filament or its prolongation, as in Tulip-tree, fig. 233.

Adpressed, or *appressed:* brought into contact, but not united.

Adscendent, ascendent, or *ascending:* rising gradually upwards.

Adsurgent, or *assurgent:* same as ascending.

Adventitious: out of the proper or usual place; e. g. *Adventitious buds,* p. 26, 27.

Adventive: applied to foreign plants accidentally or sparingly spontaneous in a country, but hardly to be called naturalized.

Æquilateral: equal-sided; opposed to oblique.

Æstivation: the arrangement of parts in a flower-bud, p. 108.

Air-cells or *Air-passages:* spaces in the tissue of leaves and some stems, p. 143.

Air-Plants, p. 34.

Akénium, or *akene.* See *achenium.*

Ala (plural *alæ*): a wing; the side-petals of a papilionaceous corolla, p. 105, fig. 218, *w.*

Alabástrum: a flower-bud.

Alar: situated in the forks of a stem.

Alate: winged, as the seeds of Trumpet-Creeper (fig. 316) the fruit of the Maple, Elm (fig. 301), &c.

Albescent: whitish, or turning white.

Absorption, p. 168.

Albúmen of the seed: nourishing matter stored up with the embryo, but not within it; p. 15, 136.

Albúmen, a vegetable product; a form of proteine, p. 165.

Albuminous (seeds): furnished with albumen, as the seeds of Indian corn (fig. 38, 39), of Buckwheat (fig. 326), &c.

Albúrnum: young wood, sap-wood, p. 153.

Alpine: belonging to high mountains above the limit of forests.

Altérnate (leaves): one after another, p. 24, 71. Petals are *alternate with* the sepals, or stamens with the petals, when they stand over the intervals between them, p. 93.

Alvéolate: honeycomb-like, as the receptacle of the Cotton-Thistle.

Ament: a catkin, p. 81. *Amentaceous:* catkin-like, or catkin-bearing.

Amorphous: shapeless; without any definite form.

Amphigástrium (plural *amphigastria*): a peculiar stipule-like leaf of certain Liverworts.

Amphítropous or *Amphítropal* ovules or seeds, p. 123, fig. 272.

Amplécrant: embracing. *Amplexicaul* (leaves): clasping the stem by the base.

Ampulláceous: swelling out like a bottle or bladder.

Amyláceous: composed of starch, or starch-like.

Anántherous: without anthers. *Anánthous:* destitute of flowers; flowerless.

Anástomosing: forming a net-work (*anastomosis*), as the veins of leaves.

Anátropous or *Anátropal* ovules or seeds; p. 123, fig. 273.

Ancípital (*ánceps*): two-edged, as the stem of Blue-eyed Grass.

Andrœcium: a name for the stamens taken together.

Andrógynous: having both staminate and pistillate flowers in the same cluster or inflorescence, as many species of Carex.

Ándrophore: a column of united stamens, as in a Mallow; or the support on which stamens are raised.

Anfráctuose: bent hither and thither, as the anthers of the Squash, &c.

Angiospérmæ, Angiospérmous Plants: with their seeds formed in an ovary or pericarp, p. 183.

Angular divergence of leaves, p. 72.

Annual (plant): flowering and fruiting the year it is raised from the seed, and then dying, p. 21.

Ánnular: in the form of a ring, or forming a circle.

Ánnulate: marked by rings; or furnished with an

Ánnulus, or ring, like that of the spore-case of most Ferns (Manual Bot. N. States, plate 9, fig. 2): in Mosses it is a ring of cells placed between the mouth of the spore-case and the lid, in many species.

Anterior, in the blossom, is the part next the bract, i. e. external: — while the posterior side is that next the axis of inflorescence. Thus, in the Pea, &c. the keel is *anterior,* and the standard *posterior.*

Anther: the essential part of the stamen, which contains the pollen; p. 86, 113.

Antherídium (plural *antheridia*): the organ in Mosses, &c. which answers to the anther of Flowering plants.

Antheríferous: anther-bearing.

Anthésis: the period or the act of the expansion of a flower.

Anthocárpous (fruits): same as multiple fruits; p. 133.

Ánticous: same as anterior.

Antrórse: directed upwards or forwards.

Apétalous: destitute of petals; p. 90, fig. 179.

Aphýllous: destitute of leaves, at least of foliage.

Ápical: belonging to the apex or point.

Apículate: pointletted; tipped with a short and abrupt point.

Apocárpous (pistils): when the several pistils of the same flower are separate, as in a Buttercup, Sedum (fig. 168), &c.

Apóphysis: any irregular swelling; the enlargement at the base of the spore-case of the Umbrella-Moss (Manual, plate 4), &c.

Appendage: any superadded part.

Appendículate: provided with appendages.

Appressed: where branches are close pressed to the stem, or leaves to the branch, &c.

Ápterous: wingless.

Aquatic: living or growing in water; applied to plants whether growing under water, or with all but the base raised out of it.

Aráchnoid: cobwebby; clothed with, or consisting of, soft downy fibres.

Arbóreous, Arborescent: tree-like, in size or form; p. 36.

Archegónium (plural *archegonia*): the organ in Mosses, &c., which is analogous to the pistil of Flowering Plants.

Árcuate: bent or curved like a bow.

Aréolate: marked out into little spaces or *areolæ*.

Árillate (seeds): furnished with an

Aril or *Aríllus:* a fleshy growth forming a false coat or appendage to a seed; p. 135, fig. 318.

Arístate: awned, i. e. furnished with an arista, like the beard of Barley, &c.

Arístulate: diminutive of the last; short-awned.

Arrow-shaped or *Arrow-headed:* same as *sagittate*; p. 59, fig. 95.

Artículated: jointed; furnished with joints or *articulations*, where it separates or inclines to do so. *Articulated leaves*, p. 64.

Artificial Classification, p. 196.

Ascending (stems, &c.), p. 37; (seeds or ovules), p. 122.

Aspergílliform: shaped like the brush used to sprinkle holy water; as the stigmas of many Grasses.

Assimilation, p. 162.

Assurgent: same as ascending, p. 37.

Átropous or *Átropal* (ovules): same as orthotropous.

Aurículate: furnished with auricles or ear-like appendages, p. 59.

Awl-shaped: sharp-pointed from a broader base, p. 68.

Awn: the bristle or beard of Barley, Oats, &c.; or any similar bristle-like appendage.

Awned: furnished with an awn or long bristle-shaped tip.

Axil: the angle on the upper side between a leaf and the stem, p. 20.

Axile: belonging to the axis, or occupying the axis; p. 119, &c.

Axillary (buds, &c.): occurring in an axil, p. 21, 77, &c.

Axis: the central line of any body; the organ round which others are attached; the root and stem. *Ascending Axis*, p. 9. *Descending Axis*, p. 9.

Baccate: berry-like, of a pulpy nature like a berry (in Latin *bacca*); p. 127.

Barbate: bearded; bearing tufts, spots, or lines of hairs.

Barbed: furnished with a *barb* or double hook; as the apex of the bristle on the fruit of Echinospermum (Stickseed), &c.

Bárbellate: said of the bristles of the pappus of some Compositæ (species of Liatris, &c.), when beset with short, stiff hairs, longer than when denticulate, but shorter than when plumose.

Barbéllulate: diminutive of barbellate.

Bark: the covering of a stem outside of the wood, p. 150, 152.

Basal: belonging or attached to the

Base: that extremity of any organ by which it is attached to its support.

Bast, *Bast-fibres*, p. 147.

Beaked: ending in a prolonged narrow tip.

Bearded: see *barbate*. *Beard* is sometimes used popularly for awn, more commonly for long or stiff hairs of any sort.

Bell-shaped: of the shape of a bell, as the corolla of Harebell, fig. 207, p. 102.

Berry: a fruit pulpy or juicy throughout, as a grape; p. 127.

Bi- (or *Bis*), in compound words: twice; as

Biartículate: twice jointed, or two-jointed; separating into two pieces.
Biaurículate: having two ears, as the leaf in fig. 96.
Bicallose: having two callosities or harder spots.
Bicárinate: two-keeled, as the upper palea of Grasses.
Bicípital (*Biceps*): two-headed; dividing into two parts at the top or bottom.
Bicónjugate: twice paired, as when a petiole forks twice.
Bidéntate: having two teeth (not twice or doubly dentate).
Biénnial: of two years' continuance; springing from the seed one season, flowering and dying the next; p. 21.
Bifárious: two-ranked; arranged in two rows.
Bifid: two-cleft to about the middle, as the petals of Mouse-ear Chickweed.
Bifóliolate: a compound leaf of two leaflets; p. 66.
Bifúrcate: twice forked; or, more commonly, forked into two branches.
Bijugate: bearing two pairs (of leaflets, &c.).
Bilábiate: two-lipped, as the corolla of sage, &c., p. 105, fig. 209.
Bilámellate: of two plates (*lamellæ*), as the stigma of Mimulus.
Bilóbed: the same as two-lobed.
Bilócular: two-celled; as most anthers, the pod of Foxglove, most Saxifrages (fig. 254), &c.
Binate: in couples, two together.
Bipartite: the Latin form of two-parted; p. 62.
Bipinnate (leaf): twice pinnate; p. 66, fig. 130.
Bipinnátifid: twice pinnatifid, p. 64; that is, pinnatifid with the lobes again pinnatifid.
Biplícate: twice folded together.
Bisérial, or *Bisériate:* occupying two rows, one within the other.
Biserrate: doubly serrate, as when the teeth of a leaf, &c. are themselves serrate.
Bitérnate: twice ternate; i. e. principal divisions 3, each bearing 3 leaflets, &c.
Bladdery: thin and inflated, like the calyx of Silene inflata.
Blade of a leaf: its expanded portion; p. 54.
Boat-shaped: concave within and keeled without, in shape like a small boat.
Bráchiate: with opposite branches at right angles to each other, as in the Maple and Lilac.
Bract (Latin, *bractea*). Bracts, in general, are the leaves of an inflorescence, more or less different from ordinary leaves. Specially, the bract is the small leaf or scale from the axil of which a flower or its pedicel proceeds; p. 78; and a
Bractlet (*bracteola*) is a bract seated *on* the pedicel or flower-stalk; p. 78, fig. 156.
Branch, p. 20, 36.
Bristles: stiff, sharp hairs, or any very slender bodies of similar appearance.
Bristly: beset with bristles.
Brush-shaped: see *aspergilliform.*
Bryology: that part of Botany which relates to Mosses.
Bud: a branch in its earliest or undeveloped state; p. 20.
Bud-scales, p. 22, 50.
Bulb: a leaf-bud with fleshy scales, usually subterranean; p. 45, fig. 73.
Bulbíferous: bearing or producing bulbs.
Bulbose or *bulbous:* bulb-like in shape, &c.

Bulblets: small bulbs, borne above ground, as on the stems of the bulb-bearing Lily and on the fronds of Cistopteris bulbifera and some other Ferns; p. 46.

Bulb-scales, p. 50.

Bullate: appearing as if blistered or bladdery (from *bulla,* a bubble).

Cadúcous: dropping off very early, compared with other parts; as the calyx in the Poppy Family, falling when the flower opens.

Cæspitose, or *Cǽspitose:* growing in turf-like patches or tufts, like most sedges, &c.

Cálcarate: furnished with a spur (*calcar*), as the flower of Larkspur, fig. 183, and Violet, fig. 181.

Calcéolate or *Cálceiform:* slipper-shaped, like one petal of the Lady's Slipper.

Cállose: hardened; or furnished with callosities or thickened spots.

Cálycine: belonging to the calyx.

Calýculate: furnished with an outer accessory calyx (*calyculus*) or set of bracts looking like a calyx, as in true Pinks.

Calýptra: the hood or veil of the capsule of a Moss: Manual, p. 607, &c.

Calýptriform: shaped like a calyptra or candle-extinguisher.

Calyx: the outer set of the floral envelopes or leaves of the flower; p. 85.

Cambium and *Cambium-layer,* p. 154.

Campánulate: bell-shaped; p. 102, fig. 207.

Campylótropous, or *Campylótropal;* curved ovules and seeds of a particular sort; p. 123, fig. 271.

Campylospérmous: applied to fruits of Umbelliferæ when the seed is curved in at the edges, forming a groove down the inner face; as in Sweet Cicely.

Canalículate: channelled, or with a deep longitudinal groove.

Cáncellate: latticed, resembling lattice-work.

Canéscent: grayish-white; hoary, usually because the surface is covered with fine white hairs. *Incanous* is whiter still.

Capilláceous, Cápillary: hair-like in shape; as fine as hair or slender bristles.

Cápitate: having a globular apex, like the head on a pin; as the stigma of Cherry, fig. 213; or forming a head, like the flower-cluster of Button-bush, fig. 161.

Capitéllate: diminutive of capitate; as the stigmas of fig. 255.

Capítulum (a little head): a close rounded dense cluster or head of sessile flowers; p. 80, fig. 161.

Capréolate: bearing tendrils (from *capreolus,* a tendril).

Capsule: a pod; any dry dehiscent seed-vessel; p. 131, fig. 305, 306.

Cápsular: relating to, or like a capsule.

Carína: a keel; the two anterior petals of a papilionaceous flower, which are combined to form a body shaped somewhat like the keel (or rather the prow) of a vessel; p. 105, fig. 218, *k.*

Cárinate: keeled; furnished with a sharp ridge or projection on the lower side.

Cariópsis, or *Caryópsis:* the one-seeded fruit or grain of Grasses, &c., p. 351.

Cárneous: flesh-colored; pale red.

Cárnose: fleshy in texture.

Cárpel, or *Carpídium:* a simple pistil, or one of the parts or leaves of which a compound pistil is composed; p. 117.

Cárpellary: pertaining to a carpel.

Carpology: that department of Botany which relates to fruits.

Cárpophore: the stalk or support of a fruit or pistil within the flower; as in fig. 276 – 278.

Cartiláginous, or *Cartilagíneous:* firm and tough, like cartilage, in texture.

Cáruncle: an excrescence at the scar of some seeds; as those of Polygala.

Carúnculate: furnished with a caruncle.

Caryophylláceous: pink-like: applied to a corolla of 5 long-clawed petals; fig. 200.

Catkin: a scaly deciduous spike of flowers, an ament; p. 81.

Caudate: tailed, or tail-pointed.

Caudex: a sort of trunk, such as that of Palms; an upright rootstock; p. 37.

Cauléscent: having an obvious stem; p. 36.

Caúlicle: a little stem, or rudimentary stem; p. 6.

Caúline: of or belonging to a stem (*caulis*, in Latin), p. 36.

Cell (diminutive *Cellule*): the cavity of an anther, ovary, &c., p. 113, 119; one of the elements or vesicles of which plants are composed; p. 140, 142.

Céllular tissue of plants; p. 142. *Cellular Bark*, p. 152.

Cellulose, p. 159.

Centrífugal (inflorescence): produced or expanding in succession from the centre outwards; p. 82. The radicle is centrifugal, when it points away from the centre of the fruit.

Centrípetal: the opposite of centrifugal; p. 79, 83.

Cereal: belonging to corn, or corn-plants.

Cérnuous: nodding; the summit more or less inclining.

Chaff: small membranous scales or bracts on the receptacle of Compositæ; the glumes, &c. of Grasses.

Chaffy: furnished with chaff, or of the texture of chaff.

Chaláza: that part of the ovule where all the parts grow together; p. 122.

Channelled: hollowed out like a gutter; same as *canaliculate*.

Character: a phrase expressing the essential marks of a species, genus, &c. which distinguish it from all others; p. 180.

Chartáceous: of the texture of paper or parchment.

Chlórophyll: the green grains in the cells of the leaf, and of other parts exposed to the light, which give to herbage its green color; p. 155.

Chrómule: coloring matter in plants, especially when not green, or when liquid.

Cícatrix: the scar left by the fall of a leaf or other organ.

Cíliate: beset on the margin with a fringe of *cilia*, i. e. of hairs or bristles, like the eyelashes fringing the eyelids, whence the name.

Cinéreous, or *Cineráceous:* ash-grayish; of the color of ashes.

Círcinate: rolled inwards from the top, like a crosier, as the shoots of Ferns; p. 76, fig. 154; the flower-clusters of Heliotrope, &c.

Circumscissile, or *Circumcissile:* divided by a circular line round the sides, as the pods of Purslane, Plantain, &c.; p. 133, fig. 298, 311.

Circumscription: the general outline of a thing.

Cirrhíferous, or *Cirrhose:* furnished with a tendril (Latin, *cirrhus*); as the Grape-vine. *Cirrhose* also means resembling or coiling like tendrils, as the leaf-stalks of Virgin's-bower; p. 37.

Class, p. 175, 177.

Classification, p. 173.

Cláthrate: latticed; same as *cancellate.*

Clávate: club-shaped; slender below and thickened upwards.

Claw: the narrow or stalk-like base of some petals, as of Pinks; p. 102, fig. 200.

Climbing: rising by clinging to other objects; p. 37.

Club-shaped: see *clavate.*

Clustered: leaves, flowers, &c. aggregated or collected into a bunch

Clýpeate: buckler-shaped.

Coádunate: same as *connate;* i. e. united.

Coaléscent: growing together.

Coárctate: contracted or brought close together.

Coated Bulbs, p. 46.

Cobwebby: same as *arachnoid;* bearing hairs like cobwebs or gossamer.

Cóccus (plural *cocci*): anciently a berry; now mostly used to denote the carpels of a dry fruit which are separable from each other, as of Euphorbia.

Cochleáriform: spoon-shaped.

Cóchleate: coiled or shaped like a snail-shell.

Cœlospérmous: applied to those fruits of Umbelliferæ which have the seed hollowed on the inner face, by the curving inwards of the top and bottom; as in Coriander.

Coherent, in Botany, is usually the same as *connate;* p. 104.

Collective fruits, p. 133.

Collum or *Collar:* the neck or line of junction between the stem and the root.

Columélla: the axis to which the carpels of a compound pistil are often attached, as in Geranium (fig. 278), or which is left when a pod opens, as in Azalea and Rhododendron.

Column: the united stamens, as in Mallow, or the stamens and pistils united into one body, as in the Orchis family, fig. 226.

Columnar: shaped like a column or pillar.

Coma: a tuft of any sort (literally, a head of hair); p. 135, fig. 317.

Cómose: tufted; bearing a tuft of hairs, as the seeds of Milkweed; fig. 317.

Cómmissure: the line of junction of two carpels, as in the fruit of Umbelliferæ, such as Parsnip, Caraway, &c.

Common: used as "general," in contradistinction to "partial"; e. g. "common involucre," p. 81.

Cómplanate: flattened.

Compound leaf, p. 64. *Compound pistil*, p. 118. *Compound umbel*, &c., p. 81.

Complete (flower), p. 89.

Complicate: folded upon itself.

Compressed: flattened on two opposite sides.

Condúplicate: folded upon itself lengthwise, as are the leaves of Magnolia in the bud, p. 76.

Cone: the fruit of the Pine family; p. 133, fig. 314.

Cónfluent: blended together; or the same as *coherent.*

Confórmed: similar to another thing it is associated with or compared to; or closely fitted to it, as the skin to the kernel of a seed.

Congésted, *Conglómerate:* crowded together.

Cónjugate: coupled; in single pairs.

Connate: united or grown together from the first.

Connéctive, Connectívum: the part of the anther connecting its two cells; p. 113.

Connívent: converging, or brought close together.

Consolidated forms of vegetation, p. 47.

Continuous: the reverse of interrupted or articulated.

Contorted: twisted together. *Contorted æstivation:* same as *convolute;* p. 109.

Contortuplícate: twisted back upon itself.

Contracted: either narrowed or shortened.

Contrary: turned in an opposite direction to another organ or part with which it is compared.

Cónvolute: rolled up lengthwise, as the leaves of the Plum in vernation; p. 76, fig. 151. In æstivation, same as *contorted;* p. 109.

Cordate: heart-shaped; p. 58, fig. 90, 99.

Coriaceous: resembling leather in texture.

Corky: of the texture of cork. *Corky layer* of bark, p. 152.

Corm, Cormus: a solid bulb, like that of Crocus; p. 44, fig. 71, 72.

Córneous: of the consistence or appearance of horn, as the albumen of the seed of the Date, Coffee, &c.

Cornículate: furnished with a small horn or spur.

Cornúte: horned; bearing a horn-like projection or appendage.

Corólla: the leaves of the flower within the calyx; p. 86.

Corolláceous, Corollíne: like or belonging to a corolla.

Coróna: a coronet or crown; an appendage at the top of the claw of some petals, as Silene and Soapwort, fig. 200, or of the tube of the corolla of Hound's-Tongue, &c.

Corónate: crowned; furnished with a crown.

Córtical: belonging to the bark (*cortex*).

Córymb: a sort of flat or convex flower-cluster; p. 79, fig. 158.

Corymbóse: approaching the form of a corymb, or branched in that way; arranged in corymbs.

Costa: a rib; the midrib of a leaf, &c. *Costate:* ribbed.

Cotylédons: the first leaves of the embryo; p. 6, 137.

Cratériform: goblet-shaped; broadly cup-shaped.

Creeping (stems): growing flat on or beneath the ground and rooting; p. 37.

Crémocarp: a half-fruit, or one of the two carpels of Umbelliferæ.

Crenate, or *Crenelled:* the edge scalloped into rounded teeth; p. 62, fig. 114.

Crested, or *Cristáte:* bearing any elevated appendage like a crest.

Cribrose: pierced like a sieve with small apertures.

Crínite: bearded with long hairs, &c.

Crown: see *corona.*

Crowning: borne on the apex of anything.

Crúciate, or *Crúciform:* cross-shaped, as the four spreading petals of the Mustard (fig. 187), and all the flowers of that family.

Crustaceous: hard, and brittle in texture; crust-like.

Cryptógamous, or *Cryptogamic:* relating to Cryptogamia; p. 172 – 201.

Cucúllate: hooded, or hood-shaped, rolled up like a cornet of paper, or a hood (*cucullus*), as the spathe of Indian Turnip, fig. 162.

Culm: a straw; the stem of Grasses and Sedges.

Cúneate, Cúneiform: wedge-shaped; p. 58, fig. 94.

Cup-shaped: same as cyathiform, or near it.
Cúpule: a little cup; the cup to the acorn of the Oak, p. 130, fig. 299.
Cúpulate: provided with a cupule.
Cúspidate: tipped with a sharp and stiff point.
Cut: same as incised, or applied generally to any sharp and deep division.
Cúticle: the skin of plants, or more strictly its external pellicle.
Cyáthiform: in the shape of a cup, or particularly of a wine-glass.
Cýcle: one complete turn of a spire, or a circle; p. 73.
Cýclical: rolled up circularly, or coiled into a complete circle.
Cyclósis: the circulation in closed cells, p. 167.
Cylindraceous: approaching to the
Cylíndrical form; as that of stems, &c., which are round, and gradually if at all tapering.
Cýmbæform, or *Cymbiform:* same as boat-shaped.
Cyme: a cluster of centrifugal inflorescence, p. 82, fig. 165, 167.
Cýmose: furnished with cymes, or like a cyme.

Deca- (in composition of words of Greek derivation): ten; as
Decágynous: with 10 pistils or styles. *Decándrous:* with 10 stamens.
Deciduous: falling off, or subject to fall, said of leaves which fall in autumn, and of a calyx and corolla which fall before the fruit forms.
Declined: turned to one side, or downwards, as the stamens of Azalea nudiflora.
Decompound: several times compounded or divided; p 67, fig. 138.
Decumbent: reclined on the ground, the summit tending to rise; p. 37.
Decurrent (leaves): prolonged on the stem beneath the insertion, as in Thistles.
Decússate: arranged in pairs which successively cross each other; fig. 147.
Definite: when of a uniform number, and not above twelve or so.
Deflexed: bent downwards.
Deflorate: past the flowering state, as an anther after it has discharged its pollen.
Dehiscence: the mode in which an anther or a pod regularly bursts or splits open; p. 132.
Dehiscent: opening by regular dehiscence.
Deliquescent: branching off so that the stem is lost in the branches, p. 25.
Deltoid: of a triangular shape, like the Greek capital Δ.
Demersed: growing below the surface of water.
Dendroid, Dendritic: tree-like in form or appearance.
Dentate: toothed (from the Latin *dens,* a tooth), p. 61, fig. 113.
Denticulate: furnished with denticulations, or very small teeth: diminutive of the last.
Depauperate (impoverished or starved): below the natural size.
Depressed: flattened, or as if pressed down from above; flattened vertically.
Descending: tending gradually downwards.
Determinate Inflorescence, p. 81, 83.
Dextrorse: turned to the right hand.
Di- (in Greek compounds): two, as
Diádelphous (stamens): united by their filaments in two sets; p. 111, fig. 227.
Diándrous: having two stamens, p. 112.
Diagnosis: a short distinguishing character, or descriptive phrase.

Diáphanous: transparent or translucent.
Dichlamýdeous (flower): having both calyx and corolla.
Dichótomous: two-forked.
Diclínous: having the stamens in one flower, the pistils in another; p. 89, fig. 176, 177.
Dicóccous (fruit): splitting into two *cocci*, or closed carpels.
Dicotylédonous (embryo): having a pair of cotyledons; p. 16, 137.
Dicotyledonous Plants, p. 150, 182.
Didymous: twin.
Didýnamous (stamens); having four stamens in two pairs, one pair shorter than the other, as in fig. 194, 195.
Diffuse: spreading widely and irregularly.
Dígitate (fingered): where the leaflets of a compound leaf are all borne on the apex of the petiole; p. 65, fig. 129.
Dígynous (flower): having two pistils or styles, p. 116.
Dímerous: made up of two parts, or its organs in twos.
Dimídiate: halved; as where a leaf or leaflet has only one side developed, or a stamen has only one lobe or cell; fig. 239.
Dimorphous: of two forms.
Diœcious, or *Dioícous:* where the stamens and pistils are in separate flowers on different plants; p. 89.
Dipétalous: of two petals. *Diphýllous:* two-leaved. *Dípterous:* two-winged.
Disciform or *Disk-shaped:* flat and circular, like a disk or quoit.
Disk: the face of any flat body; the central part of a head of flowers, like the Sunflower, or Coreopsis (fig. 224), as opposed to the *ray* or margin; a fleshy expansion of the receptacle of a flower; p. 125.
Dissected: cut deeply into many lobes or divisions.
Dissépiments: the partitions of an ovary or a fruit; p. 119.
Dístichous: two-ranked; p. 73.
Distinct: uncombined with each other; p. 102.
Diváricate: straddling; very widely divergent.
Divided (leaves, &c.): cut into divisions extending about to the base or the mid-rib; p. 62, fig. 125.
Dodeca- (in Greek compounds): twelve; as
Dodecágynous: with twelve pistils or styles.
Dodecandrous: with twelve stamens.
Dolabriform: axe-shaped.
Dorsal: pertaining to the back (*dorsum*) of an organ.
Dorsal Suture, p. 117.
Dotted Ducts, p. 148.
Double Flowers, so called: where the petals are multiplied unduly; p. 85, 98.
Downy: clothed with a coat of soft and short hairs.
Drupe: a stone-fruit; p. 128, fig. 285.
Drupaceous: like or pertaining to a drupe.
Ducts: the so-called vessels of plants; p. 146, 148.
Dumose: bushy, or relating to bushes.
Duramen: the heart-wood, p. 153.
Dwarf: remarkably low in stature.

E-, or *Ex-*, at the beginning of compound words, means destitute of; as *ecostate*, without a rib or midrib; *exalbuminous*, without albumen, &c.

Eared: see *auriculate;* p. 59, fig. 96.

Ebrácteate; destitute of bracts.

Echínate: armed with prickles (like a hedgehog). *Echínulate:* a diminutive of it.

Edentate: toothless.

Effete: past bearing, &c.; said of anthers which have discharged their pollen.

Eglandulose: destitute of glands.

Eláters: threads mixed with the spores of Liverworts. (Manual, p. 682.)

Ellipsoidal: approaching an elliptical figure.

Elliptical: oval or oblong, with the ends regularly rounded; p. 58, fig. 88.

Emárginate: notched at the summit; p. 60, fig. 108.

Émbryo: the rudimentary undeveloped plantlet in a seed; p. 6, fig. 9, 12, 26, 31 – 37, &c., and p. 136. *Embryo-sac*, p. 139.

Emersed: raised out of water.

Endecágynous: with eleven pistils or styles. *Endecándrous:* with eleven stamens.

Éndocarp: the inner layer of a pericarp or fruit; p. 128.

Éndochrome: the coloring matter of Algæ and the like.

Endógenous Stems, p. 150. *Endogenous Plants*, p. 150.

Endosmose: p. 168.

Éndosperm: another name for the albumen of a seed.

Éndostome: the orifice in the inner coat of an ovule.

Ennea-: nine. *Enneágynous:* with nine petals or styles.

Enneándrous: with nine stamens.

Ensiform: sword-shaped; as the leaves of Iris, fig. 134.

Entire: the margins not at all toothed, notched, or divided, but even; p. 61.

Ephemeral: lasting for a day or less, as the corolla of Purslane, &c.

Epi-, in composition: upon; as

Épicarp: the outermost layer of a fruit; p. 128.

Epidermal: relating to the *Epidérmis*, or the skin of a plant; p. 152, 155.

Epigæous: growing on the earth, or close to the ground.

Epígynous: upon the ovary; p. 105, 111.

Epipétalous: borne on the petals or the corolla.

Epiphýllous: borne on a leaf.

Epiphyte: a plant growing on another plant, but not nourished by it; p. 34.

Epiphýtic or *Epiphýtal:* relating to *Epiphytes;* p. 34.

Episperm: the skin or coat of a seed, especially the outer coat.

Equal: same as *regular;* or of the same number or length, as the case may be, of the body it is compared with.

Equally pinnate: same as abruptly pinnate; p. 65.

Équitant (riding straddle); p. 68, fig. 133, 134.

Erose: eroded, as if gnawed.

Eróstrate: not beaked.

Essential Organs of the flower, p. 85.

Estivátion: see *æstivation.*

Etiolated: blanched by excluding the light, as the stalks of Celery.

Evergreen: holding the leaves over winter and until new ones appear, or longer.

Exalbúminous (seed): destitute of albumen; p. 136.

Excúrrent: running out, as when a midrib projects beyond the apex of a leaf, or a trunk is continued to the very top of a tree.
Exhalation, p. 156, 169.
Exógenous Stems, p. 150. *Exogenous Plants*, p. 182.
Éxostome: the orifice in the outer coat of the ovule; p. 122.
Explanate: spread or flattened out.
Exserted: protruding out of, as the stamens out of the corolla of fig. 201.
Exstípulate: destitute of stipules.
Extra-axillary: said of a branch or bud a little out of the axil; as the upper accessory buds of the Butternut, p. 27, fig. 52.
Extrórse: turned outwards; the anther is extrorse when fastened to the filament on the side next the pistil, and opening on the outer side, as in Iris; p. 113.

Falcate: scythe-shaped; a flat body curved, its edges parallel.
Family: p. 176.
Farinaceous: mealy in texture. *Fárinose:* covered with a mealy powder.
Fásciate: banded; also applied to monstrous stems which grow flat.
Fáscicle: a close cluster; p. 83.
Fáscicled, Fascículated: growing in a bundle or tuft, as the leaves of Pine and Larch (fig. 139, 140), the roots of Pæony and Dahlia, fig. 60.
Fastígiate: close, parallel, and upright, as the branches of Lombardy Poplar.
Faux (plural, *fauces*): the throat of a calyx, corolla, &c.
Favéolate, Fávose: honeycombed; same as *alveolate.*
Feather-veined: where the veins of a leaf spring from along the sides of a midrib; p. 57, fig. 86 – 94.
Female (flowers): with pistils and no stamens.
Fenéstrate: pierced with one or more large holes, like windows.
Ferrugineous, or *Ferruginous:* resembling iron-rust; red-grayish.
Fertile: fruit-bearing, or capable of producing fruit; also said of anthers when they produce good pollen.
Fertilization: the process by which pollen causes the embryo to be formed.
Fibre, p. 145. *Fibrous:* containing much fibre, or composed of fibres.
Fibrillose: formed of small fibres.
Fibrine, p. 165.
Fiddle-shaped: obovate with a deep recess on each side.
Filament: the stalk of a stamen; p. 86, fig. 170, *a;* also any slender thread-shaped appendage.
Filaméntose, or *Filamentous:* bearing or formed of slender threads.
Fíliform: thread-shaped; long, slender, and cylindrical.
Fímbriate: fringed; furnished with fringes (*fimbriæ*).
Fístular or *Fístulose:* hollow and cylindrical, as the leaves of the Onion.
Flabélliform or *Flabéllate:* fan-shaped; broad, rounded at the summit, and narrowed at the base.
Flágellate, or *Flagélliform:* long, narrow, and flexible, like the thong of a whip; or like the runners (*flagellæ*) of the Strawberry.
Flavescent: yellowish, or turning yellow.
Fleshy: composed of firm pulp or flesh.
Fleshy Plants, p. 47.

Fléxuose, or *Fléxuous:* bending gently in opposite directions, in a zigzag way.

Floating: swimming on the surface of water.

Flóccose: composed, or bearing tufts, of woolly or long and soft hairs.

Flora (the goddess of flowers): the plants of a country or district, taken together, or a work systematically describing them; p. 3.

Floral: relating to the blossom.

Floral Envelopes: the leaves of the flower; p. 85; 99.

Floret: a diminutive flower; one of the flowers of a head (or of the so-called compound flower) of Compositæ, p. 106.

Flower: the whole organs of reproduction of Phænogamous plants; p. 84.

Flower-bud: an unopened flower.

Flowering Plants, p. 177. *Flowerless Plants,* p. 172, 177.

Foliáceous: belonging to, or of the texture or nature of, a leaf (*folium*).

Fóliose: leafy; abounding in leaves.

Fóliolate: relating to or bearing leaflets (*foliola*).

Fóllicle: a simple pod, opening down the inner suture; p. 131, fig. 302.

Follícular: resembling or belonging to a follicle.

Food of Plants, p. 160.

Foramen: a hole or orifice, as that of the ovule; p. 122.

Fornix: little arched scales in the throat of some corollas, as of Comfrey.

Fórnicate: over-arched, or arching over.

Fóveate: deeply pitted. *Fovéolate:* diminutive of *foveate.*

Free: not united with any other parts of a different sort; p. 103.

Fringed: the margin beset with slender appendages, bristles, &c.

Frond: what answers to leaves in Ferns; the stem and leaves fused into one body, as in Duckweed and many Liverworts, &c.

Frondescence: the bursting into leaf.

Fróndose: frond-bearing; like a frond: or sometimes used for leafy.

Fructification: the state of fruiting. Organs of, p. 76.

Fruit: the matured ovary and all it contains or is connected with; p. 126.

Frutéscent: somewhat shrubby; becoming a shrub (*frutex*).

Frutículose: like a small shrub. *Frúticose:* shrubby; p. 36.

Fugacious: soon falling off or perishing.

Fulvous: tawny; dull yellow with gray.

Funículus: the stalk of a seed or ovule; p. 122.

Funnel-form, or *Funnel-shaped:* expanding gradually upwards, like a funnel or tunnel; p. 102.

Fúrcate: forked.

Furfuráceous: covered with bran-like fine scurf.

Furrowed: marked by longitudinal channels or grooves.

Fuscous: deep gray-brown.

Fúsiform: spindle-shaped; p. 32.

Gáleate: shaped like a helmet (*galea*); as the upper sepal of the Monkshood, fig. 185, and the upper lip of the corolla of Dead-Nettle, fig. 209.

Gamopétalous: of united petals; same as *monopetalous,* and a better word; p. 102.

Gamophyllous: formed of united leaves. *Gamosépalous:* formed of united sepals.

Gelatine, p. 165.

Géminate: twin; in pairs; as the flowers of Linnæa.

Gemma: a bud.

Gemmation: the state of budding, or the arrangement of parts in the bud.

Gémmule: a small bud; the buds of Mosses; the plumule, p. 6.

Genículate: bent abruptly, like a knee (*genu*), as many stems.

Genus: a kind; a rank above species; p. 175, 176.

Generic Names, p. 178. *Generic Character*, p. 181.

Geographical Botany: the study of plants in their geographical relations, p. 3.

Germ: a growing point; a young bud; sometimes the same as embryo; p. 136.

Germen: the old name for ovary.

Germination: the development of a plantlet from the seed; p. 5, 137.

Gibbous: more tumid at one place or on one side than the other.

Glabrate: becoming glabrous with age, or almost glabrous.

Glabrous: smooth, i. e. having no hairs, bristles, or other pubescence.

Gladiate: sword-shaped; as the leaves of Iris, fig. 134.

Glands: small cellular organs which secrete oily or aromatic or other products: they are sometimes sunk in the leaves or rind, as in the Orange, Prickly Ash, &c.; sometimes on the surface as small projections; sometimes raised on hairs or bristles (*glandular hairs, &c.*), as in the Sweetbrier and Sundew. The name is also given to any small swellings, &c., whether they secrete anything or not.

Glandular, *Glandulose:* furnished with glands, or gland-like.

Glans (*Gland*): the acorn or mast of Oak and similar fruits.

Glaucescent: slightly glaucous, or bluish-gray.

Glaucous: covered with a *bloom*, viz. with a fine white powder that rubs off, like that on a fresh plum, or a cabbage-leaf.

Globose: spherical in form, or nearly so. *Glóbular:* nearly globose.

Glochídiate (hairs or bristles): barbed; tipped with barbs, or with a double hooked point.

Glómerate: closely aggregated into a dense cluster.

Glómerule: a dense head-like cluster; p. 83.

Glossology: the department of Botany in which technical terms are explained.

Glumaceous: glume-like, or glume-bearing.

Glume: Glumes are the husks or floral coverings of Grasses, or, particularly, the outer husks or bracts of each spikelet. (Manual, p. 535.)

Glumelles: the inner husks, or paleæ, of Grasses.

Gluten: a vegetable product containing nitrogen; p. 165.

Granular: composed of grains. *Granule:* a small grain.

Growth, p. 138.

Grumous or *Grumose:* formed of coarse clustered grains.

Guttate: spotted, as if by drops of something colored.

Gymnocárpous: naked-fruited.

Gymnospérmous: naked-seeded; p. 121.

Gymnospérmæ, or *Gymnospermous Plants*, p. 184; Manual, p. xxiii.

Gynándrous: with stamens borne on, i. e. united with, the pistil; p. 111, fig. 226.

Gynæcium: a name for the pistils of a flower taken altogether.

Gýnobase: a particular receptacle or support of the pistils, or of the carpels of a compound ovary, as in Geranium, fig. 277, 278.

Gynophore: a stalk raising a pistil above the stamens, as in the Cleome Family, p. 276.

Gyrate: coiled in a circle: same as *circinate.*

Gyrose: strongly bent to and fro.

Habit: the general aspect of a plant, or its mode of growth.

Habitat: the situation in which a plant grows in a wild state.

Hairs: hair-like projections or appendages of the surface of plants.

Hairy: beset with hairs, especially longish ones.

Halberd-shaped, or *Halberd-headed:* see *hastate.*

Halved: when appearing as if one half of the body were cut away.

Hamate or *Hamose:* hooked; the end of a slender body bent round.

Hámulose: bearing a small hook; a diminutive of the last.

Hastate or *Hastile:* shaped like a halberd; furnished with a spreading lobe on each side at the base; p. 59, fig. 97.

Heart-shaped: of the shape of a heart as commonly painted; p. 58, fig. 90.

Heart-wood: the older or matured wood of exogenous trees; p. 153.

Helicoid: coiled like a *helix* or snail-shell.

Helmet: the upper sepal of Monkshood in this shape, fig. 185, &c.

Hemi- (in compounds from the Greek): half; e. g. *Hemispherical,* &c.

Hémicarp: half-fruit, or one carpel of an Umbelliferous plant.

Hemítropous or *Hemítropal* (ovule or seed): nearly same as *amphitropous,* p. 123.

Hepta- (in words of Greek origin): seven; as,

Heptágynous: with seven pistils or styles.

Heptámerous: its parts in sevens. *Heptándrous:* having seven stamens.

Herb, p. 20.

Herbaceous: of the texture of common herbage; not woody; p. 36.

Herbarium: the botanist's arranged collection of dried plants; p. 201.

Hermaphrodite (flower): having both stamens and pistils in the same blossom; same as *perfect;* p. 89.

Heterocárpous: bearing fruit of two sorts or shapes, as in Amphicarpæa.

Heterógamous: bearing two or more sorts of flowers as to their stamens and pistils; as in Aster, Daisy, and Coreopsis.

Heteromórphous: of two or more shapes.

Heterótropous, or *Heterótropal* (ovule): the same as *amphitropous;* p. 123.

Hexa- (in Greek compounds): six; as

Hexágonal: six-angled. *Hexágynous:* with six pistils or styles.

Hexámerous: its parts in sixes. *Hexándrous:* with six stamens.

Hexápterous: six-winged.

Hilar: belonging to the hilum.

Hilum: the scar of the seed; its place of attachment; p. 122, 135.

Hippocrépiform: horseshoe-shaped.

Hirsute: hairy with stiffish or beard-like hairs.

Hispid: bristly; beset with stiff hairs. *Hispídulous* is a diminutive of it.

Hoary: grayish-white; see *canescent,* &c.

Homógamous: a head or cluster with flowers all of one kind, as in Eupatorium.

Homogéneous: uniform in nature; all of one kind.

Homomállous (leaves, &c.): originating all round a stem, but all bent or curved round to one side.

Homomórphous: all of one shape.
Homótropous or *Homótropal* (embryo): curved with the seed; curved one way.
Hood: same as *helmet* or *galea.* *Hooded:* hood-shaped; see *cucullate.*
Hooked: same as *hamate.*
Horn: a spur or some similar appendage. *Horny:* of the texture of horn.
Hortus Siccus: an herbarium, or collection of dried plants; p. 201.
Humifuse: spread over the surface of the ground.
Hyaline: transparent, or partly so.
Hybrid: a cross-breed between two allied species.
Hypocratériform: salver-shaped; p. 101, fig. 202, 203.
Hypogǽan: produced under ground.
Hypógynous: inserted under the pistil; p. 103, fig. 212.

Icosándrous: having 12 or more stamens inserted on the calyx.
Imbricate, Imbricated, Imbricative: overlapping one another, like tiles or shingles on a roof, as the scales of the involucre of Zinnia, &c., or the bud-scales of Horsechesnut (fig. 48) and Hickory (fig. 49). In æstivation, where some leaves of the calyx or corolla are overlapped on both sides by others; p. 109.
Immarginate: destitute of a rim or border.
Immersed: growing wholly under water.
Impari-pinnate: pinnate with a single leaflet at the apex; p. 65, fig. 126.
Imperfect flowers: wanting either stamens or pistils; p. 89.
Inæquilateral: unequal-sided, as the leaf of a Begonia.
Incanous: hoary with white pubescence.
Incised: cut rather deeply and irregularly; p. 62.
Included: enclosed; when the part in question does not project beyond another.
Incomplete Flower: wanting calyx or corolla; p. 90.
Incrassated: thickened.
Incumbent: leaning or resting upon: the cotyledons are incumbent when the back of one of them lies against the radicle; the anthers are incumbent when turned or looking inwards, p. 113.
Incurved: gradually curving inwards.
Indefinite: not uniform in number, or too numerous to mention (over 12).
Indefinite or *Indeterminate Inflorescence:* p. 77.
Indehíscent: not splitting open; i. e. not dehiscent; p. 127.
Indígenous: native to the country.
Individuals: p. 173.
Indúplicate: with the edges turned inwards; p. 109.
Indúsium: the shield or covering of a fruit-dot of a Fern. (Manual, p. 588.)
Inferior: growing below some other organ; p. 104, 121.
Inflated: turgid and bladdery.
Inflexed: bent inwards.
Inflorescence: the arrangement of flowers on the stem; p. 76.
Infra-axillary: situated beneath the axil.
Infundíbuliform or *Infundíbular:* funnel-shaped; p. 102, fig. 199.
Innate (anther): attached by its base to the very apex of the filament; p. 113.
Innovation: an incomplete young shoot, especially in Mosses.
Inorganic Constituents, p. 160.

Insertion: the place or the mode of attachment of an organ to its support; p. 72.

Intercellular Passages or *Spaces*, p. 143, fig. 341.

Internode: the part of a stem between two nodes; p. 42.

Interruptedly pinnate: pinnate with small leaflets intermixed with larger ones, as in Water Avens.

Intrafoliaceous (stipules, &c.): placed between the leaf or petiole and the stem.

Introrse: turned or facing inwards, i. e. towards the axis of the flower; p. 113.

Inverse or *Inverted:* where the apex is in the direction opposite to that of the organ it is compared with.

Ínvolucel: a partial or small involucre; p. 81.

Involúcellate: furnished with an involucel.

Involúcrate: furnished with an involucre.

Ínvolucre: a whorl or set of bracts around a flower, umbel, or head; p. 79.

Ínvolute, in vernation, p. 76: rolled inwards from the edges.

Irregular Flowers, p. 91.

Jointed: separate or separable at one or more places into pieces; p. 64, &c.

Keel: a projecting ridge on a surface, like the keel of a boat; the two anterior petals of a papilionaceous corolla; p. 105, fig. 217, 218, *k*.

Keeled: furnished with a keel or sharp longitudinal ridge.

Kernel of the ovule and seed, p. 122, 136.

Kidney-shaped: resembling the outline of a kidney; p. 59, fig. 100.

Labéllum: the odd petal in the Orchis Family.

Labiate: same as *bilabiate* or two-lipped; p. 105.

Laciniate: slashed; cut into deep narrow lobes (called *laciniæ*).

Lactescent: producing milky juice, as does the Milkweed, &c.

Lácunose: full of holes or gaps.

Lævigate: smooth as if polished.

Lámellar or *Lamellate:* consisting of flat plates (*lamellæ*).

Lámina: a plate or blade: the blade of a leaf, &c., p. 54.

Lanate: woolly; clothed with long and soft entangled hairs.

Lanceolate: lance-shaped; p. 58, fig. 86.

Lanuginous: cottony or woolly.

Latent buds: concealed or undeveloped buds; p. 26, 27.

Lateral: belonging to the side.

Latex: the milky juice, &c. of plants.

Lax: loose in texture, or sparse; the opposite of crowded.

Leaf, p. 49. *Leaf-buds*, p. 20, 27.

Leaflet: one of the divisions or blades of a compound leaf; p. 64.

Leaf-like: same as *foliaceous*.

Leathery: of about the consistence of leather; coriaceous.

Legume: a simple pod, dehiscent into two pieces, like that of the Pea, p. 131, fig. 303; the fruit of the Pea Family (*Leguminosæ*), of whatever shape.

Legumine, p. 165.

Leguminous: belonging to legumes, or to the Leguminous Family.

Lenticular: lens-shaped; i. e. flattish and convex on both sides.

Lépidote: leprous; covered with scurfy scales.
Liber: the inner, fibrous bark of Exogenous plants; p. 152.
Ligneous, or *Lignose:* woody in texture.
Ligulate: furnished with a ligule; p. 106.
Lígule: the strap-shaped corolla in many Compositæ, p. 106, fig. 220; the little membranous appendage at the summit of the leaf-sheaths of most Grasses.
Limb: the blade ot a leaf, petal, &c.; p. 54, 102.
Linear: narrow and flat, the margins parallel; p. 58, fig. 85.
Líneate: marked with parallel lines. *Lineolate:* marked with minute lines.
Língulate, Linguiform: tongue-shaped.
Lip: the principal lobes of a bilabiate corolla or calyx, p. 105; the odd and peculiar petal in the Orchis Family.
Lobe: any projection or division (especially a rounded one) of a leaf, &c.
Locéllus (plural *locelli*): a small cell, or compartment of a cell, of an ovary or anther.
Lócular: relating to the cell or compartment (*loculus*) of an ovary, &c.
Loculicídal (dehiscence): splitting down through the middle of the back of each cell; p. 132, fig. 305.
Locústa: a name for the spikelet of Grasses.
Lóment: a pod which separates transversely into joints; p. 131, fig. 304.
Lomentáceous: pertaining to or resembling a loment.
Lórate: thong-shaped.
Lúnate: crescent-shaped. *Lunulate:* diminutive of *lunate.*
Lýrate: lyre-shaped; a pinnatifid leaf of an obovate or spatulate outline, the end-lobe large and roundish, and the lower lobes small, as in Winter-Cress and Radish, fig. 59.

Mace: the aril of the Nutmeg; p. 135.
Máculate: spotted or blotched.
Male (flowers): having stamens but no pistil.
Mámmose: breast-shaped.
Marcescent: withering without falling off.
Marginal: belonging to the edge or margin.
Marginate: margined, with an edge different from the rest.
Masked: see *personate.*
Median: belonging to the middle.
Medúllary: belonging to, or of the nature of pith (*medulla*); pithy.
Medullary Rays: the silver-grain of wood; p. 151.
Medullary Sheath: a set of ducts just around the pith; p. 151.
Membranaceous or *Mémbranous:* of the texture of membrane; thin and more or less translucent.
Meníscoid: crescent-shaped.
Méricarp: one carpel of the fruit of an Umbelliferous plant.
Merismatic: separating into parts by the formation of partitions within.
Mésocarp: the middle part of a pericarp, when that is distinguishable into three layers; p. 128.
Mesophlœum: the middle or green bark.

Micropyle: the closed orifice of the seed; p. 135.
Midrib: the middle or main rib of a leaf; p. 55.
Milk-Vessels: p. 148.
Míniate: vermilion-colored.
Mítriform: mitre-shaped; in the form of a peaked cap.
Monadélphous: stamens united by their filaments into one set; p. 111.
Monándrous (flower): having only one stamen; p. 112.
Monilíform: necklace-shaped; a cylindrical body contracted at intervals.
Monochlamýdeous: having only one floral envelope, i. e. calyx but no corolla, as Anemone, fig. 179, and Castor-oil Plant, fig. 178.
Monocotylédonous (embryo): with only one cotyledon; p. 16, 137.
Monocotyledonous Plants, p. 150, 192.
Monœcious, or *Monoicous* (flower): having stamens or pistils only; p. 90.
Monógynous (flower): having only one pistil, or one style; p. 116.
Monopétalous (flower): with the corolla of one piece; p. 101.
Monophýllous: one-leaved, or of one piece; p. 102.
Monosépalous: a calyx of one piece; i. e. with the sepals united into one body; p. 101.
Monospérmous: one-seeded.
Monstrosity: an unnatural deviation from the usual structure or form.
Morphology: the department of botany which treats of the forms which an organ (say a leaf) may assume; p. 28.
Múcronate: tipped with an abrupt short point (*mucro*); p. 60, fig. 111.
Mucrónulate: tipped with a minute abrupt point; a diminntive of the last.
Multi-, in composition: many; as
Multangular: many-angled. *Multicípital:* many-headed, &c.
Multifarious: in many rows or ranks. *Múltifid:* many-cleft; p. 62.
Multilócular: many-celled. *Multisérial:* in many rows.
Multiple Fruits, p. 133.
Múricate: beset with short and hard points.
Múriform: wall-like; resembling courses of bricks in a wall.
Muscology: the part of descriptive botany which treats of Mosses (i. e. *Musci*).
Múticous: pointless; beardless; unarmed.
Mycélium: the spawn of Fungi; i. e. the filaments from which Mushrooms, &c. originate.

Nápiform: turnip-shaped; p. 31, fig. 57.
Natural System: p. 195.
Naturalized: introduced from a foreign country, but growing perfectly wild and propagating freely by seed.
Navícular: boat-shaped, like the glumes of most Grasses.
Necklace-shaped: looking like a string of beads; see *moniliform.*
Nectar: the honey, &c. secreted by glands, or by any part of the corolla.
Nectaríferous: honey-bearing; or having a nectary.
Nectary: the old name for petals and other parts of the flower when of unusual shape, especially when honey-bearing. So the hollow spur-shaped petals of Columbine were called nectaries; also the curious long-clawed petals of Monkshood, fig. 186, &c.

Needle-shaped: long, slender, and rigid, like the leaves of Pines; p. 68, fig. 140.
Nerve: a name for the ribs or veins of leaves, when simple and parallel; p. 56.
Nerved: furnished with nerves, or simple and parallel ribs or veins; p. 56, fig. 84.
Netted-veined: furnished with branching veins forming network; p. 56, fig. 83.
Nodding (in Latin form, *Nutant*): bending so that the summit hangs downward.
Node: a knot; the "joints" of a stem, or the part whence a leaf or a pair of leaves springs; p. 40.
Nódose: knotty or knobby. *Nódulose:* furnished with little knobs or knots.
Normal: according to rule; the pattern or natural way according to some law.
Notate: marked with spots or lines of a different color.
Nucamentaceous: relating to or resembling a small nut.
Núciform: nut-shaped or nut-like. *Núcule:* a small nut.
Nucleus: the kernel of an ovule (p. 122) or seed (p. 136) of a cell; p. 140.
Nut: a hard, mostly one-seeded indehiscent fruit; as a chestnut, butternut, acorn; p. 130, fig. 299.
Nutlet: a little nut; or the stone of a drupe.

Ob- (meaning over against): when prefixed to words, signifies inversion; as,
Obcompressed: flattened the opposite of the usual way.
Obcórdate: heart-shaped with the broad and notched end at the apex instead of the base; p. 60, fig. 109.
Oblánceolate: lance-shaped with the tapering point downwards; p. 58, fig. 91.
Oblique: applied to leaves, &c. means unequal-sided.
Oblong: from two to four times as long as broad, and more or less elliptical in outline; p. 58, fig. 87.
Obóvate: inversely ovate, the broad end upward; p. 58, fig. 93.
Obtuse: blunt, or round at the end; p. 60, fig. 105.
Obverse: same as *inverse.*
Obvolute (in the bud): when the margins of one leaf alternately overlap those of the opposite one.
Óchreate: furnished with *ochreæ* (boots), or stipules in the form of sheaths; as in Polygonum, p. 69, fig. 137.
Ochroleúcous: yellowish-white; dull cream-color.
Octo-, eight, enters into the composition of
Octágynous: with eight pistils or styles.
Octámerous: its parts in eights. *Octándrous:* with eight stamens, &c.
Offset: short branches next the ground which take root; p. 38.
One-ribbed, One-nerved, &c.: furnished with only a single rib, &c., &c.
Opaque, applied to a surface, means dull, not shining.
Opérculate: furnished with a lid or cover (*operculum*), as the capsules of Mosses.
Opposite: said of leaves and branches when on opposite sides of the stem from each other (i. e. in pairs); p. 23, 71. Stamens are opposite the petals, &c. when they stand before them.
Orbícular, Orbiculate: circular in outline or nearly so; p. 58.
Organ: any member of the plant, as a leaf, a stamen, &c.; p. 1.
Organs of Vegetation, p. 7; of *Reproduction,* p. 77.
Organized, Organic: p. 1, 158, 159, 162.
Organic Constituents, p. 160. *Organic Structure,* p. 142.

Orthótropous or *Orthótropal* (ovule or seed): p. 122, 135, fig. 270, 274.

Osseous: of a bony texture.

Oval: broadly elliptical; p. 88.

Óvary: that part of the pistil containing the ovules or future seeds; p. 86, 116.

Óvate: shaped like an egg with the broader end downwards, or, in plane surfaces, such as leaves, like the section of an egg lengthwise; p. 58, fig. 89.

Óvoid: ovate or oval in a solid form.

Óvule: the body which is destined to become a seed; p. 86, 116, 122.

Palea (plural *paleæ*): chaff; the inner husks of Grasses; the chaff or bracts on the receptacle of many Compositæ, as Coreopsis, fig. 220, and Sunflower.

Paleaceous: furnished with chaff, or chaffy in texture.

Palmate: when leaflets or the divisions of a leaf all spread from the apex of the petiole, like the hand with the outspread fingers; p. 167, fig. 129, &c.

Palmately (veined, lobed, &c.): in a palmate manner; p. 57, 63, 65.

Pandúriform: fiddle-shaped (which see).

Pánicle: an open cluster; like a raceme, but more or less compound; p. 81, fig. 163.

Panicled, Paniculate: arranged in panicles, or like a panicle.

Papery: of about the consistence of letter-paper.

Papilionaceous: butterfly-shaped; applied to such a corolla as that of the Pea and the Locust-tree; p. 105, fig. 217.

Papílla (plural *papillæ*): little nipple-shaped protuberances.

Papíllate, Papíllose: covered with papillæ.

Pappus: thistle-down. The down crowning the achenium of the Thistle, and other Compositæ, represents the calyx; so the scales, teeth, chaff, as well as bristles, or whatever takes the place of the calyx in this family, are called the pappus; fig. 292 – 296, p. 130.

Parallel-veined, or *nerved* (leaves): p. 55, 56.

Paráphyses: jointed filaments mixed with the antheridia of Mosses. (Manual, p. 607.)

Parénchyma: soft cellular tissue of plants, like the green pulp of leaves.

Paríetal (placentæ, &c.): attached to the walls (*parietes*) of the ovary or pericarp; p. 119, 120.

Parted: separated or cleft into parts almost to the base; p. 62.

Partial involucre, same as an *involucel*: *partial petiole,* a division of a main leafstalk or the stalk of a leaflet: *partial peduncle,* a branch of a peduncle: *partial umbel,* an umbellet, p. 81.

Patent: spreading; open. *Patulous:* moderately spreading.

Pauci-, in composition: few; as *pauciflorous,* few-flowered, &c.

Pear-shaped: solid obovate, the shape of a pear.

Péctinate: pinnatifid or pinnately divided into narrow and close divisions, like the teeth of a comb.

Pedate: like a bird's foot; palmate or palmately cleft, with the side divisions again cleft, as in Viola pedata, &c.

Pedately cleft, lobed, &c.: cut in a pedate way.

Pédicel: the stalk of each particular flower of a cluster; p. 78, fig. 156.

Pédicellate, Pédicelled: furnished with a pedicel.

Péduncle: a flower-stalk, whether of a single flower or of a flower-cluster; p. 78.

Péduncled, Pedúnculate: furnished with a peduncle.

Peltate: shield-shaped: said of a leaf, whatever its shape, when the petiole is attached to the lower side, somewhere within the margin; p. 59, fig. 102, 178.

Pendent: hanging. *Pendulous:* somewhat hanging or drooping.

Penícillate: tipped with a tuft of fine hairs, like a painter's pencil; as the stigmas of some Grasses.

Penta- (in words of Greek composition): five; as

Pentágynous: with five pistils or styles; p. 116.

Pentámerous: with its parts in fives, or on the plan of five.

Pentándrous: having five stamens; p. 112. *Pentástichous:* in five ranks.

Pepo: a fruit like the Melon and Cucumber; p. 128.

Perennial: lasting from year to year; p. 21.

Perfect (flower): having both stamens and pistils; p. 89.

Perfóliate: passing through the leaf, in appearance; p. 67, fig. 131, 132.

Pérforate: pierced with holes, or with transparent dots resembling holes, as an Orange-leaf.

Périanth: the leaves of the flower generally, especially when we cannot readily distinguish them into calyx and corolla; p. 85.

Péricarp: the ripened ovary; the walls of the fruit; p. 127.

Pericárpic: belonging to the pericarp.

Périchæth: the cluster of peculiar leaves at the base of the fruit-stalk of Mosses.

Perichætial: belonging to the perichæth.

Perigónium, Perigóne: same as *perianth.*

Perigýnium: bodies around the pistil; applied to the closed cup or bottle-shaped body which encloses the ovary of Sedges, and to the bristles, little scales, &c. of the flowers of some other Cyperaceæ.

Perígynous: the petals and stamens borne on the calyx; p. 104, 111.

Perípheric: around the outside, or periphery, of any organ.

Périsperm: a name for the albumen of a seed (p. 136).

Péristome: the fringe of teeth, &c. around the orifice of the capsule of Mosses. (Manual, p. 607.)

Persístent: remaining beyond the period when such parts commonly fall, as the leaves of evergreens, and the calyx, &c. of such flowers as remain during the growth of the fruit.

Pérsonate: masked; a bilabiate corolla with a projection, or *palate,* in the throat, as of the Snapdragon; p. 106, fig. 210, 211.

Petal: a leaf of the corolla; p. 85.

Petaloid: petal-like; resembling or colored like petals.

Pétiole: a footstalk of a leaf; a leaf-stalk, p. 54.

Petioled, Petiolate: furnished with a petiole.

Petíolulate: said of a leaflet when raised on its own partial leafstalk.

Phænógamous, or *Phanerógamous:* plants bearing flowers and producing seeds; same as Flowering Plants; p. 177, 182.

Phyllódium (plural *phyllodia*): a leaf where the blade is a dilated petiole, as in New Holland Acacias; p. 69.

Phyllotáxis, or *Phyllotaxy:* the arrangement of leaves on the stem; p. 71.

Physiological Botany, Physiology, p. 3.

Phyton: a name used to designate the pieces which by their repetition make up a plant, theoretically, viz. a joint of stem with its leaf or pair of leaves.

Pilíferous: bearing a slender bristle or hair (*pilum*), or beset with hairs.

Pílose: hairy; clothed with soft slender hairs.

Pinna: a primary branch of the petiole of a bipinnate or tripinnate leaf, as fig. 130, p. 66.

Pínnule: a secondary branch of the petiole of a bipinnate or tripinnate leaf; p. 66.

Pínnate (leaf): when the leaflets are arranged along the sides of a common petiole; p. 65, fig. 126 – 128.

Pinnately lobed, cleft, parted, divided, &c., p. 63.

Pinnátifid: same as pinnately cleft; p. 63, fig. 119.

Pistil: the seed-bearing organ of the flower; p. 86, 116.

Pistillídium: the body which in Mosses, Liverworts, &c. answers to the pistil.

Pitchers, p. 51, fig. 79, 80.

Pith: the cellular centre of an exogenous stem; p. 150, 151.

Pitted: having small depressions or pits on the surface, as many seeds.

Placénta: the surface or part of the ovary to which the ovules are attached; p. 118.

Plaited (in the bud); p. 76, fig. 150; p. 110, fig. 225.

Plane: flat, outspread.

Plicate: same as *plaited.*

Plumose: feathery; when any slender body (such as a bristle of a pappus) is beset with hairs along its sides, like the plumes or the beard on a feather.

Plúmule: the little bud or first shoot of a germinating plantlet above the cotyledons; p. 6, fig. 5; p. 137.

Pluri-, in composition: many or several; as

Plurifoliolate: with several leaflets; p. 66.

Pod: specially a legume, p. 131; also applied to any sort of capsule.

Pódosperm: the stalk of a seed.

Pointless: destitute of any pointed tip, such as a *mucro, awn, acumination,* &c.

Pollen: the fertilizing powder of the anther; p. 86, 114.

Pollen-mass: applied to the pollen when the grains all cohere into a mass, as in Milkweed and Orchis.

Poly- (in compound words of Greek origin): same as *multi-* in those of Latin origin, viz. many; as

Polyadélphous: having the stamens united by their filaments into several bundles; p. 112.

Polyándrous: with numerous (more than 20) stamens (inserted on the receptacle); p. 112.

Polycotylédonous: having many (more than two) cotyledons, as Pines; p. 17, 137, fig. 45, 46.

Polýgamous: having some perfect and some separated flowers, on the same or on different individuals, as the Red Maple.

Polýgonal: many-angled.

Polýgynous: with many pistils or styles; p. 116.

Polýmerous: formed of many parts of each set.

Polymórphous: of several or varying forms.

Polypétalous: when the petals are distinct or separate (whether few or many); p. 103.

Polyphýllous: many-leaved; formed of several distinct pieces, as the calyx of Sedum, fig. 168, Flax, fig. 174, &c.

Polysépalous: same as the last when applied to the calyx; p. 103.

Polyspérmous: many-seeded.

Pome: the apple, pear, and similar fleshy fruits; p. 128.

Porous: full of holes or pores.

Pouch: the silicle or short pod, as of Shepherd's Purse; p. 133.

Præfloration: same as *æstivation;* p. 106.

Præfoliation: same as *vernation;* p. 75.

Præmórse: ending abruptly, as if bitten off.

Prickles: sharp elevations of the bark, coming off with it, as of the Rose; p. 39.

Prickly: bearing prickles, or sharp projections like them.

Prímine: the outer coat of the covering of the ovule; p. 124.

Primórdial: earliest formed; primordial leaves are the first after the cotyledons.

Prismátic: prism-shaped; having three or more angles bounding flat or hollowed sides.

Process: any projection from the surface or edge of a body.

Procumbent: trailing on the ground; p. 37.

Produced: extended or projecting, as the upper sepal of a Larkspur is *produced* above into a spur; p. 91, fig. 183.

Prolíferous (literally, bearing offspring): where a new branch rises from an older one, or one head or cluster of flowers out of another, as in Filago Germanica, &c.

Prostrate: lying flat on the ground.

Protéine: a vegetable product containing nitrogen; p. 165.

Prótoplasm: the soft nitrogenous lining or contents of cells; p. 165.

Prúinose, Pruinate: frosted; covered with a powder like hoar-frost.

Pubérulent: covered with fine and short, almost imperceptible down.

Pubéscent: hairy or downy, especially with fine and soft hairs or *pubescence.*

Pulvérulent, or *Pulveraceous:* dusted; covered with fine powder, or what looks like such.

Púlvinate: cushioned, or shaped like a cushion.

Punctate: dotted, either with minute holes or what look as such (as the leaves of St. John's-wort and the Orange), or with minute projecting dots.

Pungent: very hard, and sharp-pointed; prickly-pointed.

Putámen: the stone of a drupe, or the shell of a nut; p. 128.

Pyramidal: shaped like a pyramid.

Pyréne, Pyréna: a seed-like nutlet or stone of a small drupe.

Pyxis, Pyxídium: a pod opening round horizontally by a lid; p. 133, fig. 298, 311.

Quadri-, in words of Latin origin: four; as

Quadrángular: four-angled. *Quadrifoliate:* four-leaved.

Quádrifid: four-cleft; p. 62.

Quatérnate: in fours. *Quinate:* in fives.

Quincúncial: in a quincunx; when the parts in æstivation are five, two of them outside, two inside, and one half out and half in, as shown in the calyx, fig. 224.

Quíntuple: five-fold.

Race: a marked variety which may be perpetuated from seed; p. 174.

Raceme: a flower-cluster, with one-flowered pedicels arranged along the sides of a general peduncle; p. 78, fig. 156.

Rácemose: bearing racemes, or raceme-like.

Rachis: see *rhachis.*

Radial: belonging to the ray.

Rádiate, or *Radiant:* furnished with ray-flowers; p. 107.

Rádical: belonging to the root, or apparently coming from the root.

Rádicant: rooting, taking root on or above the ground, like the stems of Trumpet-Creeper and Poison-Ivy.

Rádicels: little roots or rootlets.

Radicle: the stem-part of the embryo, the lower end of which forms the root; p. 6, fig. 4, &c.; p. 137.

Rameal: belonging to a branch. *Ramose:* full of branches (*rami*).

Rámulose: full of branchlets (*ramuli*).

Raphe: see *rhaphe.*

Ray: the marginal flowers of a head (as of Coreopsis, p. 107, fig. 219) or cluster (as of Hydrangea, fig. 167), when different from the rest, especially when ligulate, and diverging (like rays or sunbeams); the branches of an umbel, which diverge from a centre; p. 79.

Receptacle: the axis or support of a flower; p. 86, 124; the common axis or support of a head of flowers; fig. 230.

Reclined: turned or curved downwards; nearly recumbent.

Recurved: curved outwards or backwards.

Reduplicate (in æstivation): valvate with the margins turned outwards, p. 109.

Reflexed: bent outwards or backwards.

Refracted: bent suddenly, so as to appear broken at the bend.

Regular: all the parts similar; p. 89.

Réniform: kidney-shaped; p. 58, fig. 100.

Repánd: wavy-margined; p. 62, fig. 115.

Répent: creeping, i. e. prostrate and rooting underneath.

Réplum: the persistent frame of some pods (as of Prickly Poppy and Cress), after the valves fall away.

Reproduction, organs of: all that pertains to the flower and fruit; p. 76.

Resúpinate: inverted, or appearing as if upside down, or reversed.

Reticulated: the veins forming network, as in fig. 50, 83.

Retroflexed: bent backwards; same as *reflexed.*

Retúse: blunted; the apex not only obtuse, but somewhat indented; p. 60, fig. 107.

Révolute: rolled backwards, as the margins of many leaves; p. 76.

Rhachis (the backbone): the axis of a spike, or other body; p. 78.

Rhaphe: the continuation of the seed-stalk along the side of an anatropous ovule (p. 123) or seed; fig. 273, *r*, 319 and 320, *b*.

Rháphides: crystals, especially needle-shaped ones, in the tissues of plants.

Rhizóma: a rootstock; p. 40, fig. 64 – 67.

Rhombic: in the shape of a rhomb. *Rhomboidal:* approaching that shape.

Rib: the principal piece, or one of the principal pieces, of the framework of a leaf, p. 55; or any similar elevated line along a body.

Ring: an elastic band on the spore-cases of Ferns. (Manual, p. 587, plate 9, fig. 2, 3.)

Ringent: grinning; gaping open; p. 102, fig. 209.

Root, p. 28.

Root-hairs, p. 31, 149.

Rootlets: small roots, or root-branches; p. 29.

Rootstock: root-like trunks or portions of stems on or under ground; p. 40.

Rosaceous: arranged like the petals of a rose.

Rostéllate: bearing a small beak (*rostellum*).

Róstrate: bearing a beak (*rostrum*) or a prolonged appendage.

Rósulate: in a regular cluster of spreading leaves, resembling a full or double rose, as the leaves of Houseleek, &c.

Rótate: wheel-shaped: p. 101, fig. 204, 205.

Rotund: rounded or roundish in outline.

Rudimentary: imperfectly developed, or in an early state of development.

Rúgose: wrinkled, roughened with wrinkles.

Rúminated (albumen): penetrated with irregular channels or portions filled with softer matter, as a nutmeg.

Rúncinate: coarsely saw-toothed or cut, the pointed teeth turned towards the base of the leaf, as the leaf of a Dandelion.

Runner: a slender and prostrate branch, rooting at the end, or at the joints, as of a Strawberry, p. 38.

Sac: any closed membrane, or a deep purse-shaped cavity.

Ságittate: arrowhead-shaped; p. 59, fig. 95.

Salver-shaped, or *Salver-form:* with a border spreading at right angles to a slender tube, as the corolla of Phlox, p. 101, fig. 208, 202.

Samára: a wing-fruit, or key, as of Maple, p. 5, fig. 1, Ash, p. 131, fig. 300, and Elm, fig. 301.

Sámaroid: like a samara or key-fruit.

Sap: the juices of plants generally. Ascending or crude sap; p. 161, 168. Elaborated sap, that which has been digested or assimilated by the plant; p. 162, 169.

Sárcocarp: the fleshy part of a stone-fruit, p. 128.

Sarmentáceous: bearing long and flexible twigs (*sarments*), either spreading or procumbent.

Saw-toothed: see *serrate.*

Scábrous: rough or harsh to the touch.

Scaláriform: with cross-bands, resembling the steps of a ladder.

Scales: of buds, p. 22, 50; of bulbs, &c., p. 40, 46, 50.

Scaly: furnished with scales, or scale-like in texture; p. 46, &c.

Scandent: climbing; p. 37.

Scape: a peduncle rising from the ground, or near it, as of the stemless Violets, the Bloodroot, &c.

Scápiform: scape-like.

Scar of the seed, p. 135. *Leaf-scars*, p. 21.

Scárious or *Scariose:* thin, dry, and membranous.

Scóbiform: resembling sawdust.

Scórpioid or *Scorpioídal:* curved or circinate at the end, like the tail of a scorpion, as the inflorescence of Heliotrope.

Scrobículate: pitted; excavated into shallow pits.

Scurf, Scurfiness: minute scales on the surface of many leaves, as of Goosefoot, Buffalo-berry, &c.

Scútate: buckler-shaped.

Scutéllate, or *Scutélliform:* saucer-shaped or platter-shaped.

Sécund: one-sided; i. e. where flowers, leaves, &c. are all turned to one side.

Secúndine: the inner coat of the ovule; p. 124.

Seed, p. 134. *Seed-coats,* p. 134. *Seed-vessel,* p. 127.

Segment: a subdivision or lobe of any cleft body.

Ségregate: separated from each other.

Semi- (in compound words of Latin origin): half; as

Semi-adherent, as the calyx or ovary of Purslane, fig. 214. *Semicordate:* half-heart-shaped. *Semilunar:* like a half-moon. *Semiovate:* half-ovate, &c.

Seminal: relating to the seed. *Seminíferous:* seed-bearing.

Sempervírent: evergreen.

Sepal: a leaf or division of the calyx; p. 85.

Sépaloid: sepal-like. *Sepaline:* relating to the sepals.

Separated Flowers: those having stamens or pistils only; p. 89.

Septate: divided by partitions (*septa*).

Séptenate: with parts in sevens.

Septicídal: where a pod in dehiscence splits through the partitions, dividing each into two layers; p. 132, fig. 306.

Septíferous: bearing the partition.

Septífragal: where the valves of a pod in dehiscence break away from the partitions; p. 132.

Septum (plural *septa*): a partition, as of a pod, &c.

Sérial, or *Seriate:* in rows; as *biserial,* in two rows, &c.

Seríceous: silky; clothed with satiny pubescence.

Serótinous: happening late in the season.

Serrate, or *Serrated:* the margin cut into teeth (*serratures*) pointing forwards; p. 61, fig. 112.

Sérrulate: same as the last, but with fine teeth.

Sessile: sitting; without any stalk, as a leaf destitute of petiole, or an anther destitute of filament.

Seta: a bristle, or a slender body or appendage resembling a bristle.

Setáceous: bristle-like. *Setíform:* bristle-shaped.

Setígerous: bearing bristles. *Setose:* beset with bristles or bristly hairs.

Sex: six; in composition. *Sexangular:* six-angled, &c.

Sheath: the base of such leaves as those of Grasses, which are

Sheathing: wrapped round the stem.

Shield-shaped: same as *scutate,* or as *peltate,* p. 59.

Shrub, p. 21.

Sígmoid: curved in two directions, like the letter S, or the Greek *sigma.*

Silículose: bearing a silicle, or a fruit resembling it.

Sílicle: a pouch, or short pod of the Cress Family; p. 133.

Silíque: a longer pod of the Cress Family; p. 133, fig. 310.

Siliquose: bearing siliques or pods which resemble siliques.

Silky: glossy with a coat of fine and soft, close-pressed, straight hairs.

Silver-grain of wood; p. 151.

Silvery: shining white or bluish-gray, usually from a silky pubescence.

Simple: of one piece; opposed to *compound.*

Sinistrorse: turned to the left.

Sínuate: strongly wavy; with the margin alternately bowed inwards and outwards; p. 62, fig. 116.

Sinus: a recess or bay; the re-entering angle or space between two lobes or projections.

Sleep of Plants (so called), p. 170.

Sobolíferous: bearing shoots from near the ground.

Solitary: single; not associated with others.

Sorus (plural *sori*): the proper name of a fruit-dot of Ferns.

Spadix: a fleshy spike of flowers; p. 80, fig. 162.

Spathaceous: resembling or furnished with a

Spathe: a bract which inwraps an inflorescence; p. 80, fig. 162.

Spátulate, or *Spathulate:* shaped like a spatula; p. 58, fig. 92.

Special Movements, p. 170.

Species, p. 173.

Specific Character, p. 181. *Specific Names,* p. 179.

Spicate: belonging to or disposed in a spike.

Spíciform: in shape resembling a spike.

Spike: an inflorescence like a raceme, only the flowers are sessile; p. 80, fig. 160.

Spikelet: a small or a secondary spike; the inflorescence of Grasses.

Spine: a thorn; p. 39.

Spindle-shaped: tapering to each end, like a radish; p. 31, fig. 59.

Spinescent: tipped by or degenerating into a thorn.

Spinose, or *Spiniferous:* thorny.

Spiral arrangement of leaves, p. 72. *Spiral vessels or ducts,* p. 148.

Sporángia, or *Spórocarps:* spore-cases of Ferns, Mosses, &c.

Spore: a body resulting from the fructification of Cryptogamous plants, in them taking the place of a seed.

Sporule: same as a spore, or a small spore.

Spur: any projecting appendage of the flower, looking like a spur, as that of Larkspur, fig. 183.

Squamate, Squamose, or *Squamaceous:* furnished with scales (*squamæ*).

Squamellate or *Squámulose:* furnished with little scales (*squamellæ* or *squamulæ*).

Squámiform: shaped like a scale.

Squarrose: where scales, leaves, or any appendages, are spreading widely from the axis on which they are thickly set.

Squárrulose: diminutive of *squarrose;* slightly squarrose.

Stalk: the stem, petiole, peduncle, &c., as the case may be.

Stamen, p. 86, 111.

Staminate: furnished with stamens; p. 89. *Stamineal:* relating to the stamens.

Staminódium: an abortive stamen, or other body resembling a sterile stamen.

Standard: the upper petal of a papilionaceous corolla; p. 105, fig. 217, 218, a.

Starch: a well-known vegetable product; p. 163.

Station: the particular place, or kind of situation, in which a plant naturally occurs.

Stéllate, Stéllular: starry or star-like; where several similar parts spread out from a common centre, like a star.

Stem, p. 36, &c.

Stemless: destitute or apparently destitute of stem.

Sterile: barren or imperfect; p. 89.

Stigma: the part of the pistil which receives the pollen; p. 87.

Stigmátic, or *Stigmatose:* belonging to the stigma.

Stipe (Latin *stipes*): the stalk of a pistil, &c., when it has any; the stem of a Mushroom.

Stipel: a stipule of a leaflet, as of the Bean, &c.

Stipéllate: furnished with stipels, as the Bean and some other Leguminous plants.

Stípitate: furnished with a stipe, as the pistil of Cleome, fig. 276.

Stípulate: furnished with stipules.

Stipules: the appendages one each side of the base of certain leaves; p. 69.

Stolons: trailing or reclined and rooting shoots; p. 37.

Stoloníferous: producing stolons.

Stomate (Latin *stoma*, plural *stomata*): the breathing-pores of leaves, &c.; p. 156.

Strap-shaped: long, flat, and narrow; p. 106.

Striate, or *Striated:* marked with slender longitudinal grooves or channels (Latin *striæ*).

Strict: close and narrow; straight and narrow.

Strigíllose, Strígose: beset with stout and appressed, scale-like or rigid bristles.

Strobiláceous: relating to, or resembling a

Stróbile: a multiple fruit in the form of a cone or head, as that of the Hop and of the Pine; fig. 314, p. 133.

Stróphiole: same as *caruncle*. *Strophiolate:* furnished with a strophiole.

Struma: a wen; a swelling or protuberance of any organ.

Style: a part of the pistil which bears the stigma; p. 86.

Stylopódium: an epigynous disk, or an enlargement at the base of the style, found in Umbelliferous and some other plants.

Sub-, as a prefix: about, nearly, somewhat; as *subcordate*, slightly cordate: *subserrate*, slightly serrate: *subaxillary*, just beneath the axil, &c., &c.

Súberose: corky or cork-like in texture.

Subclass, p. 177, 183. *Suborder*, p. 176. *Subtribe*, p. 177.

Súbulate: awl-shaped; tapering from a broadish or thickish base to a sharp point; p. 68.

Succulent: juicy or pulpy.

Suckers: shoots from subterranean branches; p. 37.

Suffrutéscent: slightly shrubby or woody at the base only; p. 36.

Sugar, p. 163.

Sulcate: grooved longitudinally with deep furrows.

Supernumerary Buds: p. 26.

Supérvolute: plaited and convolute in bud; p. 110, fig. 225.

Supra-axillary: borne above the axil, as some buds; p. 26, fig. 52.

Supra-decompound: many times compounded or divided.

Súrculose: producing suckers, or shoots resembling them.

Suspended: hanging down. Suspended ovules or seeds hang from the very summit of the cell which contains them; p. 122, fig. 269.

Sútural: belonging or relating to a suture.

Súture: the line of junction of contiguous parts grown together; p. 117.

Sword-shaped: vertical leaves with acute parallel edges, tapering above to a point; as those of Iris, fig. 133.

Symmetrical Flower: similar in the number of parts of each set; p. 89.

Synántherous, or *Syngenesious:* where stamens are united by their anthers; p. 112, fig. 229.

Syncárpous (fruit or pistil): composed of several carpels consolidated into one.

System, p. 195.

Systematic Botany: the study of plants after their kinds; p. 3.

Taper-pointed: same as *acuminate;* p. 60, fig. 103.

Tap-root: a root with a stout tapering body; p. 32.

Tawny: dull yellowish, with a tinge of brown.

Taxónomy: the part of Botany which treats of classification.

Tégmen: a name for the inner seed-coat.

Tendril: a thread-shaped body used for climbing, p. 38: it is either a branch, as in Virginia Creeper, fig. 62; or a part of a leaf, as in Pea and Vetch, fig. 127.

Térete: long and round; same as *cylindrical*, only it may taper.

Términal: borne at, or belonging to, the extremity or summit.

Terminólogy: the part of the science which treats of technical terms; same as *glossology*.

Térnate: in threes; p. 66. *Ternately:* in a ternate way.

Testa: the outer (and usually the harder) coat or shell of the seed; p. 134.

Tetra- (in words of Greek composition): four; as,

Tetracóccous: of four cocci or carpels.

Tetradýnamous: where a flower has six stamens, two of them shorter than the other four, as in Mustard, p. 92, 112, fig. 188.

Tetrágonal: four-angled. *Tetrágynous:* with four pistils or styles; p. 116.

Tetrámerous: with its parts or sets in fours.

Tetrándrous: with four stamens; p. 112.

Theca: a case; the cells or lobes of the anther.

Thorn: see *spine;* p. 39.

Thread-shaped: slender and round, or roundish like a thread; as the filament of stamens generally.

Throat: the opening or gorge of a monopetalous corolla, &c., where the border and the tube join, and a little below.

Thyrse or *Thyrsus:* a compact and pyramidal panicle; p. 81.

Tómentose: clothed with matted woolly hairs (*tomentum*).

Tongue-shaped: long, flat, but thickish, and blunt.

Toothed: furnished with teeth or short projections of any sort on the margin; used especially when these are sharp, like saw-teeth, and do not point forwards; p. 61, fig. 113.

Top-shaped: shaped like a top, or a cone with its apex downwards.

Tórose, Tórulose: knobby; where a cylindrical body is swollen at intervals.
Torus: the receptacle of the flower; p. 86, 124.
Tree, p. 21.
Tri-, in composition: three; as
Triadélphous: stamens united by their filaments into three bundles; p. 112.
Triándrous: where the flower has three stamens; p. 112.
Tribe, p. 176.
Trichótomous: three-forked. *Tricóccous:* of three cocci or roundish carpels.
Trícolor: having three colors. *Tricóstate:* having three ribs.
Tricúspidate: three-pointed. *Tridéntate:* three-toothed.
Triénnial: lasting for three years.
Trifárious: in three vertical rows; looking three ways.
Trífid: three-cleft; p. 62.
Trifóliate: three-leaved. *Trifóliolate:* of three leaflets; p. 66.
Trifúrcate: three-forked. *Trígonous:* three-angled, or triangular.
Trígynous: with three pistils or styles; p. 116. *Tríjugate:* in three pairs (*jugi*).
Trilóbed, or *Trilobate:* three-lobed; p. 62.
Trilócular: three-celled, as the pistils or pods in fig. 225–227.
Trímerous: with its parts in threes, as Trillium, fig. 189.
Trinérvate: three-nerved, or with three slender ribs.
Triœcious: where there are three sorts of flowers on the same or different individuals; as in Red Maple.
Tripártible: separable into three pieces. *Tripártite:* three-parted; p. 62.
Tripétalous: having three petals; as in fig. 189.
Triphýllous: three-leaved; composed of three pieces.
Tripínnate: thrice pinnate; p. 66. *Tripinnátifid:* thrice pinnately cleft; p. 64.
Triple-ribbed, Triple-nerved, &c.: where a midrib branches into three near the base of the leaf, as in Sunflower.
Triquétrous: sharply three-angled; and especially with the sides concave, like a bayonet.
Trisérial, or *Triseriate:* in three rows, under each other.
Trístichous: in three longitudinal or perpendicular ranks.
Tristigmátic, or *Tristígmatose:* having three stigmas.
Trisúlcate: three-grooved.
Tritérnate: three times ternate; p. 67.
Trivial Name: the specific name.
Trochlear: pulley-shaped.
Trŭmpet-shaped: tubular, enlarged at or towards the summit, as the corolla of Trumpet-Creeper.
Truncate: as if cut off at the top; p. 60, fig. 106.
Tube, p. 102.
Trunk: the main stem or general body of a stem or tree.
Tuber: a thickened portion of a subterranean stem or branch, provided with eyes (buds) on the sides; as a potato, p. 43, fig. 68.
Túbercle: a small excrescence.
Tubercled, or *Tuberculate:* bearing excrescences or pimples.
Túberous: resembling a tuber. *Tuberiferous:* bearing tubers.
Túbular: hollow and of an elongated form; hollowed like a pipe.

Tumid: swollen; somewhat inflated.
Túnicate: coated; invested with layers, as an onion; p. 46.
Túrbinate: top-shaped. *Turgid:* thick as if swollen.
Túrio (plural *turiones*): young shoots or suckers springing out of the ground; as Asparagus-shoots.
Turnip-shaped: broader than high, and abruptly narrowed below; p. 32, fig. 57.
Twin: in pairs (see *geminate*), as the flowers of Linnæa
Twining: ascending by coiling round a support, like the Hop; p. 37.
Typical: well expressing the characteristics of a species, genus, &c.

Úmbel: the umbrella-like form of inflorescence; p. 79, fig. 159.
Umbéllate: in umbels. *Umbellíferous:* bearing umbels.
Úmbellet: a secondary or partial umbel; p. 81.
Umbílicate: depressed in the centre, like the ends of an apple.
Úmbonate: bossed; furnished with a low, rounded projection like a boss (*umbo*).
Umbráculiform; umbrella-shaped, like a Mushroom, or the top of the style of Sarracenia.
Unarmed: destitute of spines, prickles, and the like.
Úncinate: hook-shaped; hooked over at the end.
Under-shrub: partially shrubby, or a very low shrub.
Úndulate: wavy, or wavy-margined; p. 62.
Unequally pinnate: pinnate with an odd number of leaflets; p. 65.
Unguículate: furnished with a claw (*unguis*); p. 102, i. e. a narrow base, as the petals of a Rose, where the claw is very short, and those of Pinks (fig. 200), where the claw is very long.
Uni-, in compound words: one; as
Uniflórous: one-flowered. *Unifóliate:* one-leaved.
Unifóliolate: of one leaflet; p. 66. *Unijugate:* of one pair.
Unilábiate: one-lipped. *Unilateral:* one-sided.
Unilócular: one-celled, as the pistil in fig. 261, and the anther in fig. 238, 239.
Unióvulate: having only one ovule, as in fig. 213, and fig. 267 – 269.
Unisérial: in one horizontal row.
Uniséxual: having stamens or pistils only, as in Moonseed, fig. 176, 177, &c.
Únivalved: a pod of only one piece after dehiscence, as fig. 253.
Urcéolate: urn-shaped.
Útricle: a small, thin-walled, one-seeded fruit, as of Goosefoot; p. 130, fig. 350.
Utrícular: like a small bladder.

Váginate: sheathed, surrounded by a sheath (*vagina*).
Valve: one of the pieces (or doors) into which a dehiscent pod, or any similar body, splits; p. 131, 114.
Valvate, Válvular: opening by valves. *Valvate* in æstivation, p. 109.
Variety, p. 174, 177.
Váscular: containing vessels, or consisting of vessels, such as ducts; p. 146, 148.
Vaulted: arched; same as *fornicate.*
Vegetable Physiology, p. 3.
Veil: the calyptra of Mosses. (Manual, p. 607.)
Veins: the small ribs or branches of the framework of leaves, &c.; p. 55.

Veined, *Veiny:* furnished with evident veins. *Veinless:* destitute of veins.
Veinlets: the smaller ramifications of veins.
Velate: furnished with a veil.
Velútinous: velvety to the touch.
Venation: the veining of leaves, &c.; p. 55.
Vénose: veiny; furnished with conspicuous veins.
Ventral: belonging to that side of a simple pistil, or other organ, which looks towards the axis or centre of the flower; the opposite of dorsal; as the
Ventral Suture, p. 117.
Véntricose: inflated or swelled out on one side.
Vénulose: furnished with veinlets.
Vermícular: shaped like worms.
Vernation: the arrangement of the leaves in the bud; p. 75.
Vérnicose: the surface appearing as if varnished.
Vérrucose: warty; beset with little projections like warts.
Vérsatile: attached by one point, so that it may swing to and fro, as the anthers of the Lily and Evening Primrose; p. 113, fig. 234.
Vertex: same as the *apex*.
Vértical: upright; perpendicular to the horizon, lengthwise.
Vérticil: a whorl; p. 71. *Verticillate:* whorled; p. 71, 75, fig. 148.
Vésicle: a little bladder. *Embryonal Vesicle*, p. 139. *Vesicular:* bladdery.
Vessels: ducts, &c.; p. 146, 148.
Véxillary, *Vexillar:* relating to the
Véxillum: the standard of a papilionaceous flower; p. 105, fig. 218, *s.*
Villose: shaggy with long and soft hairs (*villosity*.)
Vimíneous: producing slender twigs, such as those used for wicker-work.
Vine: any trailing or climbing stem; as a Grape-vine.
Viréscent, *Viridescent:* greenish; turning green.
Vírgate: wand-shaped, as a long, straight, and slender twig.
Viscous, *Viscid:* having a glutinous surface.
Vitta (plural *vittæ*): the oil-tubes of the fruit of Umbelliferæ.
Vóluble: twining, as the stem of Hops and Beans; p. 37.

Wavy: the surface or margin alternately convex and concave; p. 62.
Waxy: resembling beeswax in texture or appearance.
Wedge-shaped: broad above, and tapering by straight lines to a narrow base; p. 58, fig. 94.
Wheel-shaped: see *rotate;* p. 102, fig. 204, 205.
Whorl, *Whorled:* when leaves, &c. are arranged in a circle round the stem, p. 71, 75, fig. 148.
Wing: any membranous expansion. *Wings* of papilionaceous flowers, p. 105.
Winged: furnished with a wing; as the fruit of Ash and Elm. fig. 300, 301.
Wood, p. 145. *Woody:* of the texture or consisting of wood.
Woody Fibre, or *Wood-Cells*, p. 146.
Woolly: clothed with long and entangled soft hairs; as the leaves of Mullein.

THE END.

School and College Edition.

MANUAL

OF THE

BOTANY

OF THE

NORTHERN UNITED STATES.

REVISED EDITION;

INCLUDING

VIRGINIA, KENTUCKY, AND ALL EAST OF THE MISSISSIPPI;

ARRANGED

ACCORDING TO THE NATURAL SYSTEM.

BY ASA GRAY,

FISHER PROFESSOR OF NATURAL HISTORY IN HARVARD UNIVERSITY.

With Six Plates,

ILLUSTRATING THE GENERA OF FERNS, ETC.

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ADVERTISEMENT.

THE complete edition of the MANUAL OF THE BOTANY OF THE NORTHERN UNITED STATES includes the two great Cryptogamous Families of *Mosses* and *Liverworts* (from p. 607 to p. 704), written by Mr. Sullivant, and illustrated with eight copper-plates, crowded with admirable figures. Important as this part is to the Botanist and the advanced student, it is much too difficult for the beginner, and for common instruction in Botany in schools and academies, which will begin with the Phænogamous or Flowering Plants, and will rarely extend into the Flowerless Plants beyond the *Ferns* and *Club-Mosses*. As it adds considerably to the size and expense of the book, the part here mentioned is omitted in this *Abridged Impression*, which is intended especially for the use of classes, and is afforded by the publishers at a price so reduced as to bring the work within the reach of all students.

The six plates which illustrate the *Ferns* and their allies (and which are numbered from IX to XIV) are also given; so that this edition is illustrated like the other, so far as it goes, and nothing is omitted which ordinary students will require, at least until they have become expert Botanists. It will be seen by the paging, that the omitted matter immediately precedes and follows the Index.

Some additions and corrections are given on the following pages.

ADDITIONS AND CORRECTIONS.

Page 39, line 14. After "Maine," add: *Nuttall.* Echo Lake, Franconia, New Hampshire, *Tuckerman.*

Page 71, line 23. Linum Boottii; add syn.: L. sulcatum, *Riddell* (an older name which has been overlooked).

Page 78. To Vitis vulpina, add: Bark close, not separating in shreds, as in the other species.

Page 118. To Potentilla frigida, add habitat: Alpine region of the White Mountains (*Robbins*) and of Mount Lafayette (*Tuckerman*), New Hampshire.

Page 132. To Jussiæa, add:—

2. **J. rèpens,** L. Glabrous or nearly so; stem creeping, or floating and rooting; leaves oblong, tapering below into a slender petiole; flowers large, long-peduncled; calyx-lobes and slightly obcordate petals 5; pod cylindrical, with a tapering base. ♃ — In water, Illinois, Kentucky, and southward.

Page 136. Opuntia vulgaris, var.? Rafinesquii, now distinguished by Dr. Engelmann as a species, under the name of O. Rafinesquii, grows from Wisconsin to Kentucky and southwestward.

Page 143. To Saxifraga, add:

9. **S. stellàris,** L. var. **comòsa,** Willd. Leaves wedge-shaped, more or less toothed; scape a span high, bearing a small contracted panicle; many or most of the flowers changed into little tufts of green leaves, the perfect flowers with a free reflexed calyx; petals unequal, lanceolate, white, with two yellowish spots on the base, which is narrowed into a distinct claw. — Mount Katahdin, Maine, *Rev. J. Blake.*

Page 169, after line 13 from bottom, add:

9. POLYPREMUM. Corolla and single style very short. Pod many-seeded, loculicidal. Leaves slightly connected at the base, very narrow.

Page 174, add:

9. POLYPRÈMUM, L. POLYPREMUM.

Calyx 4-parted, persistent; the divisions awl-shaped from a broad scarious-margined base. Corolla not longer than the calyx, almost wheel-shaped, bearded in the throat; the 4 lobes imbricated in the bud. Stamens

4, very short: anthers globular. Style 1, very short: stigma ovoid, entire. Pod ovoid, a little flattened, notched at the apex, loculicidally 2-valved, many-seeded. — A smooth, diffusely spreading and much-branched small annual, with narrowly linear or awl-shaped leaves, connected at their base across the stem by a slight stipular line; the small flowers solitary and sessile in the forks and at the ends of the branches; corolla inconspicuous, white. (Name altered from πολύπρεμνος, *many-stemmed.*)

1. **P. procúmbens,** L. — Dry fields, mostly in sandy soil, Virginia and southward. June - Sept.

Page 205, after Solidago nemoralis, add:

27′. **S. Rádula,** Nutt. Stem and oblong or obovate-spatulate leaves rigid and very rough, not hoary, the upper sessile; scales of the involucre oblong, rigid; rays 3-6: otherwise much as in No. 27. — Dry hills, W. Illinois and southwestward.

Page 213. XANTHIUM SPINÒSUM should have been printed in small capitals (as here), being an introduced species.

Page 226, line 24; after "hemispherical" add: (merely convex in No. 1).

Page 231, at the end of Senecio, add:

* * * *Rays present: root annual: heads in a crowded corymb.*

5. **S. lobàtus,** Pers. (BUTTER-WEED.) Glabrous, or loosely woolly at first; leaves rather fleshy, lyrate or pinnately divided; the divisions crenate or cut-lobed, variable. — Low banks of the Ohio and Mississippi, Illinois, and southward.

Page 231, line 2 from bottom, add: Lake Superior, *Prof. Whitney.*

Page 234, line 11, add: W. Illinois and westward; common.

Page 268, lines 9, 10 from bottom, in place of "or terete," insert: flat or flattish and channelled above.

Page 281, line 23, for "Lake Huron," read: Lake Michigan.

Page 288, line 18, read: from Vermont and New Hampshire to Virginia and southward, chiefly near the coast.

Page 291, line 26, for "12-20-seeded," read: 1-2-seeded.

Page 310, line 22, for "River-banks and plains," read: Oak-openings and woods. Line 23, for "July," read: May, June.

Page 352, line 2. Asclepias Sullivantii has *scarcely sessile* leaves; and the horns of the hoods of the corolla are flat, broadly scythe-shaped, and abruptly acute.

Page 352, after line 7, add:

2′. **A. Meádii,** n. sp. Torr. Very smooth, pale; stem simple (1° high), bearing a single terminal umbel (on a peduncle 3′ long); *leaves* all opposite, sessile, oblong, the upper ovate-oblong or somewhat heart-shaped, obtuse, mucronate, the plane (*not wavy*) margins and the numerous rather slender pedicels downy when young; divisions of the greenish-white corolla oblong-ovate (4″ long), half the length of the pedicel; *hoods of the slightly* *stipitate crown fleshy below*, rounded-truncate at the summit, *longer than the thickish incurved horn*, furnished with a small sharp tooth at the inner margin on each side towards the summit. — Augusta, Illinois, *Mead*. — Leaves about 4 pairs, 1½′ — 2½′ long. Fruit not seen; so that it is uncertain whether the species should stand next to A. Sullivantii or A. obtusifolia.

6. **A. Nuttalliàna.** This will probably take the name of A. Vaseyi, *Carey, ined.*, *Engelm. mss.*, as it now seems probable that Nuttall's A. lanuginosa is the same as Lapham's Acerates monocephala.

Page 354, to Acerates add:

1ª. **A. monocéphala,** n. sp. Lapham in herb. Low (6′-12′ high), rather stout, hirsute; leaves lanceolate, almost sessile (about 2′ long and ½′ wide); umbel solitary and terminal, peduncled, very many-flowered; divisions of the greenish corolla oblong (2½″ long), more than twice the length of the calyx, several times shorter than the pedicels; hoods of the crown sessile at the base of the tube of filaments, strongly concave, oblong, erect, with the obtuse apex somewhat spreading, equalling the anthers. — Prairies of Wisconsin, *Lapham*, *Mr. Cornell*. July. — Intermediate in several respects between A. viridiflora and A. longifolia; having the sessile crown of the former, and flowers not larger than those of the latter. Hoods more cucullate than those of A. viridiflora; the two small appendages within each, and the still smaller pairs of appendages alternate with the hoods, more conspicuous than in the last-named species; otherwise very similar. Pollen-masses also thicker and less club-shaped. — A. longifolia is well distinguished by the raised crown, of broader hoods, much shorter than the anthers, and by the thick and short pollen-masses. — Should Dr. Engelmann's surmise prove correct (as is most likely), this species will bear the name of A. lanuginosa, *Decaisne*.

Page 369, line 21. Euxolus deflexus; the plant here so named, from Albany, is not so, but apparently is Amarantus polygonoides, *L.*, or Amblogyna polygonoides, *Raf.*; the latter genus not distinct enough from Euxolus.

Page 369, line 25. Euxolus pumilus is *prostrate*, fleshy, its leaves mostly *long-petioled*, *obovate*, and *notched* at the end.

Page 388, line 15, &c. Euphorbia obtusata here includes two species; viz. the indigenous E. obtusata (Virginia to Illinois and southward); and the introduced E. platyphylla, *L.*, Vermont to Niagara, &c. (Nat. from Eu.)

Page 405, line 4. The Rock Chestnut-Oak (var. monticola) should rather be placed under No. 5, Q. Castanea.

Page 465, line 2, under Medeola: for "base," read "middle," and add "extrorse!" For "Styles 3," &c., read: Style none; stigmas 3, recurved-diverging, long and thread-form.

Page 598, line 24, for "Sept." read: July - Sept.

PREFACE.

THIS work is designed as a compendious Flora of the Northern portion of the United States, arranged according to the Natural System, for the use of students and of practical botanists.

The first edition was hastily prepared to supply a pressing want. Its plan, having been generally approved, has not been altered, although the work has been to a great extent rewritten. Its increased size is mainly owing to the larger geographical area embraced in it, being here extended southward so as to include Virginia and Kentucky, and westward to the Mississippi River.

This southern boundary coincides better than any other geographical line with the natural division between the cooler-temperate and the warm-temperate vegetation of the United States; very few characteristically Southern plants occurring north of it, and those only on the low coast of Virginia, in the Dismal Swamp, &c. Our western limit, also, while it includes a considerable prairie vegetation, excludes nearly all the plants peculiar to the great Western woodless plains, which approach our borders in Iowa and Missouri. Our northern boundary, being that of the United States, varies through about five degrees of latitude, and nearly embraces Canada proper on the east and on the west, so that nearly all the plants of Canada East on this side of the St. Lawrence, as well as of the deep peninsula of Canada West, will be found described in this volume.

The principal facts respecting the geographical distribution of the plants which compose the flora of our district, will be presented in another place. In this work I endeavor briefly to indicate the district in which each species occurs, or in which it most abounds, in the following manner: 1. When the principal area of a species is northward rather than southward, I generally give first its northern limit, so far as known to me, if within the United States, and then its southern limit if within our boundaries, or add that it extends *southward*, meaning thereby that the species in question occurs in the States south of Virginia or Kentucky. Thus *Magnolia glauca*, p. 16, a prevailingly Southern species, but which is sparingly found as far north as Massachusetts, is recorded as growing "near Cape Ann and New York southward, near the coast"; *M. acuminata*, "W. New York, Pennsylvania, Ohio, and southward"; &c. While in species of northern range, the southern limits are mentioned; as, *Nuphar Kalmiana*, p. 23, "New England, New York, and northward"; *Cardamine pratensis*, p. 33, "Vermont to Wisconsin, northward," &c. And so of Western plants; e. g. *Isopyrum biternatum*, p. 11, "Ohio, Kentucky, and westward"; *Psoralea argophylla*, p. 94, "Wisconsin and westward"; *Amorpha canescens*, p. 95, "Michigan to Wisconsin, and southwestward." 2. Where no habitat or range is mentioned, the species is supposed to be diffused over our whole area, or nearly so, and usually beyond it. 3. When the species is of local or restricted occurrence, so far as known, the special habitat is given; e. g. *Vesicaria Shortii* and *V. Lescurii*, p. 38; *Sullivantia Ohionis*, p. 144, &c. Except in such cases, the want of space has generally demanded the omission of particular localities, which are so appropriate and so useful both in local Floras and in more detailed works, but for which there is no room in a manual like this.

For the same reason, I could not here undertake to specify the range of those species which extend beyond the geographical limits of this work, or beyond the United States. Nevertheless, to facilitate the comparison of our flora with that of Europe, I have appended the mark (Eu.) to those species which are indigenous to both.

Foreign plants which have become denizens of the soil are of course enumerated and described along with the genuine indigenous members of our flora; but the *introduced* species are distinguished by the specific name being printed in a different type, namely, in small capitals (e. g. Ranunculus ACRIS, p. 10), while the names of the indigenous species are in full-face letter (e. g. **R. repens**). Moreover, the country from which they were introduced is specified (mostly Europe), as well as the nature of the denizenship. That is, following the suggestions of M. Alphonse De Candolle, I have classified our introduced plants as well as I could into two sorts, the thoroughly *naturalized*, and the *adventive;* the first comprising those species which have made themselves perfectly at home in this country, propagating themselves freely by seed beyond the limits of cultivated grounds; the second, those which are only locally spontaneous, and perhaps precarious, or which are spontaneous only in cultivated fields, around dwellings, or in manured soil, and which, still dependent upon civilized man, would probably soon disappear if he were to abandon the country. (I here rank with the *adventive* plants those which De Candolle terms plants cultivated without or against man's will.) Accordingly the species *naturalized from Europe* are indicated, at the close of the paragraph, by the phrase "(Nat. from

Eu.)": those *adventive*, or imperfectly naturalized from Europe, by the phrase "(Adv. from Eu.)," &c.

Such varieties as are marked and definite enough to require names are distinguished in this edition into two sorts, according to their degree of apparent distinctness: — 1. Those which, I think, can hardly be doubted to be varieties of the species they are referred to, at least by those who hold sound views as to what a species is, have the name printed in small capitals; e. g. Nasturtium palustre, var. HISPIDUM, p. 30; Vitis cordifolia, var. RIPARIA, p. 78. 2. Those so peculiar that they have not only for the most part been taken for species, but may still be so regarded by many most excellent botanists; some of them I may myself so regard hereafter, on further and more critical examination of the apparently connecting forms. The names of these are printed in the same full-face type as those of the indigenous species (e. g. Ranunculus aquatilis, var. **divaricatus,** p. 7; Actæa spicata, var. **rubra,** and var. **alba,** p. 14); and they usually stand at the head of a separate paragraph.

Another important feature of the present edition consists in the plates, fourteen in number, crowded with figures, illustrating the genera of the six Cryptogamous Orders (Mosses, Ferns, &c.) embraced in the work. The eight most elaborate and admirable plates illustrating the Mosses and Liverworts are furnished by my generous friend, Mr. Sullivant, the author of that portion of this work.* The remaining six plates, devoted to the Ferns and their allies, were drawn from nature, and executed by Mr. Isaac Sprague.

Mr. Sullivant has included in this edition all the species of *Musci* and *Hepaticæ* known to him as natives of any part of the United States east of the Mississippi, and has sedulously elaborated the whole anew; not only laying a broad foundation for a knowledge of North American Muscology, but furnishing botanical students with facilities for the study of these two beautiful families of plants such as have never before anywhere been afforded in a book of this kind.†

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* The illustrations of forty of the genera, as indicated in the Explanation of the Plates at the close of the volume, are entirely original productions of Mr. Sullivant's pencil. Seven of them represent new species, and for most of the others those species were chosen which have before been only imperfectly if at all figured. The rest of the genera were taken from Schimper, Bischoff, or Hooker, but amended or altered in accordance with the object in view, and the suggestions of an actual examination of the plant, which was always made.

† The reference "*Musc. Bor.-Amer.*," appended to many new or rare Mosses, is made to an almost complete arranged collection of the *Musci* and *Hepaticæ* east of the Mississippi, the types in great measure of the present elaboration of these families, all critically studied by Messrs. Sullivant and Lesquereux, and published in sets of specimens by the latter.

The materials from which these sets have been prepared are chiefly Mr. Lesquereux's own very extensive collections, the result of his numerous journeys made during the last six or seven years, especially in the southern ranges of the Alleghany Mountains. To these have been added Mr. Sullivant's ample accumulations, embracing the collections of the lamented

Probably the time is now not far distant when, as the result especially of the labors and investigations of Prof. Tuckerman upon our *Lichenes*, of the Rev. Dr. Curtis upon our *Fungi*, and of Prof. Harvey upon our *Algæ*, as well as of Messrs. Sullivant and Lesquereux upon our *Mosses*, all our Cryptogamia may be in a similar manner presented to the student, in the form of a supplementary volume, separate from that comprising the Phænogamous or Flowering Plants.

I have omitted from this edition the concise Introduction to Botany, and the Glossary, prefixed to the first; supplying their place with a more extended, familiar, and copiously illustrated elementary work, especially intended for beginners (*First Lessons in Botany*), and which may, when desired, be bound up with the present volume. Or the student may use the author's *Botanical Text-Book* for the same purpose. In either of these, all the technical terms employed in this volume are explained and illustrated. Having prepared this Manual for students rather than for learned botanists, I have throughout endeavored to smooth the beginner's way by discarding many an unnecessary technical word or phrase, and by casting the language somewhat in a vernacular mould, — perhaps at some sacrifice of brevity, but not, I trust, of the precision for which botanical language is distinguished.

Botanists may find some reason to complain of the general omission of synonymes; but it should be considered that all synonymes are useless to the beginner, — whose interests I have particularly kept in view, — while the greater part are needless to the instructed botanist, who has access to more elaborate works in which they are plentifully given. By discarding them, except in case of some original or recent changes in nomenclature, I have been able to avoid abbreviations (excepting those of author's names, and some few customary ones of States, &c.), to give greater fulness to the characters of the species, and especially of the genera, (a point in which I conceive most works of this class are deficient,) and also to add the derivation of the generic names.

The Natural Orders are disposed in a series which nearly corresponds, in a general way, with De Candolle's arrangement, beginning with the highest class and ending with the lowest; and commencing this first and far the largest class (of *Dicotyledonous or Exogenous Plants*) with those orders in which the flowers are mostly provided with double floral enve-

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Mr. Oakes in the White Mountains, of Fendler in New Mexico, and of Wright in Texas. The title of the work is "Musci Boreali-Americani, sive Specimina Exsiccata Muscorum in Americæ Rebuspublicis Fœderatis detectorum, conjunctis studiis W. S. Sullivant et L. Lesquereux, 1856." Mr. Sullivant's connection with the work extends no further than to a joint and equal responsibility in the determination of the species. This most extensive and valuable collection ever made of American Mosses, which has cost much labor and expense, and comprises nearly 400 species and marked varieties, is published at $20 for each set, and will doubtless be eagerly sought after by Bryological students.

lopes, viz. with both calyx and corolla, and in which the corolla consists of separate petals (the *Polypetalous* division); beginning this series with those orders in which the several organs of the flower are most distinct and separate (*hypogynous*), and proceeding to those which have the parts most combined among themselves and consolidated with each other (*perigynous* and *epigynous*); then follow those with the petals combined into a monopetalous corolla (the *Monopetalous* division); and, finally, those destitute of a corolla or destitute of all floral envelopes (the *Apetalous* division). The class of *Monocotyledonous* or *Endogenous Plants* opens with orders exhibiting one form of simplified flowers, passes to those with the organs most combined and consolidated, then to those most perfect and less combined, and closes with other simplified and reduced forms. The present problem in Botany is to group the numerous Natural Orders in each class into natural alliances. But this has not yet been done in such a manner as to be available to the ordinary student.

I do not here attempt, therefore, to group the orders naturally, but let them follow one another in what seems to be on the whole the most natural and practically convenient sequence. And, by means of an *Analytical Artificial Key to the Natural Orders* * (p. xvii.), I enable the student very readily to refer any of our plants to its proper Family. This Key is entirely remodelled in the present edition, is founded on characters of easy observation, and is so arranged as to provide for all the exceptional instances and variant cases I could think of. I shall be disappointed if the attentive student is not able by it to refer to its proper order any to him unknown plant of the Northern States of which he has flowering specimens. Referring to the Order indicated, the student will find its distinctive points, which he has chiefly to consider, brought together and printed in italics in the first sentence of the description.

Then, to abridge the labor of further analysis as much as possible, I have given a synopsis of the genera under each order, whenever it comprises three or more of them, enumerating some of their leading characters, and grouping them under their respective tribes, suborders, &c., as the case may be. I have also taken pains to dispose the species of every extensive genus under sections (§) or subgenera (§ with a name in capitals), subsections (*), and subordinate divisions (+–, ++, &c.); and whenever there are two or more species under a division, I have *italicized* some of the principal distinctions (after the manner of Koch's *Flora Germanica*), so that they may at once catch the student's eye.

To aid in the pronunciation of the generic and specific names, &c., I have not only marked the accented syllable, but have followed Loudon's mode of indicating what is called the long sound of the vowel by the grave (\`), and the short sound by the acute accent-mark (´). In respect to this, my friend, MR. FOLSOM, has obligingly rendered most important assistance throughout the pages of this volume.

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* No Linnæan Artificial Arrangement is here given, experience having shown that, as a Key to the Natural Orders or to the genera, it offers no clear advantage on the score of facility over a well-devised Analytical Key; which the learner will find equally certain, and much more satisfactory in its results.

The imperative necessity of economizing space to the utmost, alone has debarred me from more largely recording my acknowledgments to numerous obliging correspondents, in all parts of the country, who have contributed to this work, either by notes of corrections, observations, or catalogues, or by communicating specimens of rare or local plants. In the comparison of our flora with that of Europe, I am greatly indebted to my excellent friend and correspondent, M. GODET of Neuchatel, author of the *Flore du Jura*, for a suite of authentically determined plants of that district, and for a series of acute and very important critical notes upon many of our own identical or related species.

As to special collaborators in the preparation of the work, in addition to the acknowledgments made in the preface to the former edition, I have again to express my particular indebtedness to my friends, JOHN CAREY, ESQ., now of London, for various emendations in the genus *Carex*, formerly elaborated by him for this work; and DR. ENGELMANN of St. Louis, for full notes upon the botany of our Western borders, many critical observations upon various genera, and for contributing the articles upon *Cuscuta*, *Euphorbia*, and the three genera of *Alismeæ*. The renewed and still more extensive contributions of MR. SULLIVANT have already been referred to, — contributions which introduce a new era in the study of American Muscology, and which justly claim, not only my warm personal acknowledgments, but the gratitude of all the votaries of our science in this country.

I renew the request, that those who use this book will kindly furnish information of all corrections or additions that may appear to be necessary, so that it may be made more accurate and complete in a future edition

HARVARD UNIVERSITY, CAMBRIDGE,
June 30th, 1856.

ABBREVIATIONS AND SIGNS USED IN THIS WORK.

I. PRINCIPAL ABBREVIATIONS OF THE NAMES OF AUTHORS.

Adans.	=	Adanson.	*Hartm.*	=	Hartmann.
Ait.		Aiton.	*Hedw.*		Hedwig.
Andr.		Andrews.	*Hoffm.*		Hoffmann.
Arn.		Arnott.	*Hook.*		Hooker.
Aubl.		Aublet.	*Hook. f.* (*filius*)		J. D. Hooker.
Bart.		Barton.	*Hornsch.*		Hornschuch.
Bartl.		Bartling.	*Huds.*		Hudson.
Beauv.		Palisot de Beauvois.	*Hub.*		Hübener.
Benth.		Bentham.	*Jacq.*		Jacquin.
Bernh.		Bernhardi.	*Juss.*		JUSSIEU.
Bieb.		Bieberstein.	*L.* or *Linn.*		LINNÆUS.
Bigel.		Bigelow.	*Lag.*		Lagasca.
Br. & Sch.		Bruch and (W. P.) Schimper.	*Lam.*		Lamarck.
Brid.		Bridel.	*Lamb.*		Lambert.
Brongn.		Brongniart.	*Ledeb.*		Ledebour.
Cass.		Cassini.	*L'Her.*		L'Heritier.
Cav.		Cavanilles.	*Lehm.*		Lehmann.
Cham.		Chamisso.	*Lesqx.*		Lesquereux.
Chav.		Chavannes.	*Lestib.*		Lestibudois.
DC.		De Candolle.	*Lindenb.*		Lindenberg.
A. DC.		Alphonse De Candolle.	*Lindl.*		Lindley.
Desf.		Desfontaines.	*Mich.*		Micheli.
Dew.		Dewey.	*Michx.*		Michaux (the older).
Dill.		Dillenius.	*Michx. f.*		F. A. Michaux (the younger).
Dumort.		Dumortier.	*Mill.*		Miller.
Ehrh.		Ehrhart.	*Mitch.*		Mitchell.
Ell.		Elliott.	*Mont.*		Montagne.
Endl.		Endlicher.	*Muhl.*		Muhlenberg.
Engelm.		Engelmann.	*Mull.*		C. Muller.
Gærtn.		Gærtner.	*Nees.*		Nees von Esenbeck.
G. L. & N.		Gottsche, Lindenberg, & Nees.	*Nutt.*		Nuttall.
Gmel.		Gmelin.	*Pav.*		Pavon.
Good.		Goodenough.	*Pers.*		Persoon.
Grev.		Greville.	*Pluk.*		Plukenet.
Griseb.		Grisebach.	*Plum.*		Plumier.
Gronov.		Gronovius.	*Poir.*		Poiret.

R. Br. =	ROBERT BROWN.	*Steud.* =	Steudel.
Raf.	Rafinesque.	*Sulliv.*	Sullivant.
Rich.	Richard.	*Tayl.*	J. Taylor.
Richards.	Richardson.	*Torr.*	Torrey.
Rœm.	Rœmer.	*Torr. & Gr.*	Torrey and Gray.
Salisb.	Salisbury.	*Tourn.*	Tournefort.
Schimp.	W. P. Schimper.	*Trin.*	Trinius.
Schk.	Schkuhr.	*Tuckerm.*	Tuckerman.
Schlecht.	Schlechtendal.	*Vaill.*	Vaillant.
Schrad.	Schrader.	*Vent.*	Ventenat.
Schreb.	Schreber.	*Vill.*	Villars.
Schult.	Schultes.	*Wahl.*	Wahlenberg.
Schw. or *Schwein.*	Schweinitz.	*Walt.*	Walter.
Schwægr.	Schwægrichen.	*Web.*	Weber.
Scop.	Scopoli.	*Willd.*	Willdenow.
Soland.	Solander.	*Wils.*	Wilson.
Spreng.	Sprengel.	*Wulf.*	Wulfen.

II. SIGNS USED IN THIS WORK.

① An annual plant.
② A biennial plant.
♃ A perennial plant.
? A mark of doubt.
! A mark of affirmation or authentication.

1°, 2′, 3″. To save space, the sign of degrees (°) is used for feet; of minutes (′) for inches; of seconds (″) for lines, — the (English) line being the twelfth part of an inch.

The dash – between two figures, as 5 – 10, means from 5 to 10, &c.

DIRECTIONS TO THE UNPRACTISED STUDENT.

THE Student is supposed to have a general acquaintance with the rudiments of Structural Botany, such as is readily to be acquired from the author's *First Lessons in Botany*, or his Botanical Text-Book, or from any other similar treatise. One of these will be needed for reference while using this Manual. The former is much the simplest, and was expressly prepared for the beginner's use. To learn the meaning of all words he meets with, and which he does not precisely understand, he has only to refer, as occasion requires, to the Glossary or Dictionary of Botanical Terms appended to either of these books, especially to that in the *Lessons on Botany*.

To show the beginner how to proceed in using the *Manual* for the purpose of ascertaining the name, and the place in the system, &c. of any of our wild plants, we will take an example. Suppose him to make his first trial with the common Spiderwort, which grows wild throughout the southern and western parts of our country, is cultivated in most gardens, and blooms the whole summer long.

With a flowering specimen in hand, let the student turn to the following *Artificial Key to the Natural Orders*, p. xvii. Having flowers, it is evident the plant belongs to the great series of *Phænogamous or Flowering Plants*. To which of its two classes is the first question. To answer this, let the student compare the plant with the characters — that is, the enumeration of the principal distinctions — of Class I. given on p. xvii., and of Class II. on p. xxi. Without the seeds, which may not be ripe, — and if they were it might require more skill than could be expected of the beginner to dissect them, — we cannot directly ascertain whether the embryo is monocotyledonous or dicotyledonous. But the other characters are abundantly sufficient, and easy to verify. Take first the stem; is it formed on the exogenous or endogenous plan? A slice across it plainly shows, to the naked eye, or by the aid of a common magnifying-glass, that there is no distinction of parts into pith, bark, and a ring of wood or woody tissue between these two: but the woody part of the stem is here represented by separate bundles, or threads, whose cut ends, as seen in the cross-section in the form of dots, are scattered throughout the whole diameter, — just as in a stalk of Indian Corn, a rattan, or a Palm-stem, — leaving no central pith and showing no tendency to form a ring or layer of wood. It is therefore *endogenous*. The simple, parallel-veined leaves show the same thing, and so does the arrangement of the flower with its parts in threes, — namely, three sepals, three petals, six (twice 3) stamens; and even the pistil, if the ovary be cut across, is found to have three cells. So the plant plainly belongs to Class II. *Monocotyledonous or Endogenous Plants*.

We have next to refer it to its proper Order under this Class, which is readily done by following the successive subdivisions in the Artificial Key. The first division is into three groups, marked **A.** **B.** and **C.** Of these B. alone has "flowers with true floral envelopes," and therefore includes our plant. The subdivision of B. is into "1. *Flowers densely crowded on a spadix,*" and "2. *Flowers not on a spadix.*" Our plant falls under the latter. This is subdivided into "* *Perianth adherent to the ovary,*" and "* * *Perianth free from the ovary.*" Our plant accords with the latter. This is subdivided into four groups, with this mark (+-), characterized by the nature of the perianth; and it is evident that our plant, having 3 green sepals, and 3 colored petals, and no glumaceous or husky bracts, falls into the third group, +- +- +-. Under this there are four alternatives, based on differences in the pistil. The numerous distinct pistils exclude the first; the many or several seeds in each cell exclude the second; the one-celled ovary, &c. exclude the fourth; while the third, having a single pistil with a 2-3-celled ovary, and only one or two ovules or seeds in each cell, agrees with our plant; which we are thus brought to conclude must belong to the order *Commelynaceæ*. The number, 485, affixed to this name, refers to the page in the body of the work where this order is characterized.

After comparing the plant with the ordinal character, especially with that portion of it in italic type, and noting the agreement, let the student proceed to determine the Genus. We have only two genera in this order, viz.: 1. *Commelyna*, which has irregular flowers, petals unlike and on long claws, and the stamens of two sorts, only three of them bearing perfect anthers, — all of which is very different from the plant we are studying; and 2. *Tradescantia* (p. 286), with the characters of which our plant will be found perfectly to accord.

Let the student then proceed to ascertain the Species, of which three are described under this genus. Of the two sections, marked with stars (*), our plant belongs to the first, having a sessile umbel. And of its two species, a comparison with the characters of each fixes our plant as belonging to the first, viz. *T. Virginica*.

The abbreviated name or letter after the name of the genus and that of the species, denotes the founder of the genus or the species; — in this instance Linnæus, whose name is indicated by the abbreviation L.

Whenever an order comprises several genera, a synopsis of them is given, like that of *Ranunculaceæ*, p. 2, by the aid of which the student will readily determine the genus of the plant under examination. The number prefixed to the name of the genus, in the synopsis, is that under which it stands, farther on, in the full account. The genera in the synopsis are often ranked under their proper Tribes, or Suborders, &c.; and the student will first determine the Tribe, or other great group to which the plant he is examining belongs, and then the Genus under that tribe, &c.

Sometimes a genus embraces two or more strongly marked sections, or *Subgenera*, which are designated by the mark § followed by a name. For example, *Cimicifuga*, p. 14, has two subgenera, § 1. *Macrotys*, and § 2. *Cimicifuga* proper, each with its own characters; and the genus *Rhus*, p. 76, has three subgenera, viz. § 1. *Sumac*, § 2. *Toxicodendron*, and § 3. *Lobadium*. These names, however, do not make a part of the appellation of a plant, which is called by its generic and its specific name only; as, *Cimicifuga racemosa*, the Black Snakeroot; *Rhus glabra*, the Smooth Sumac, &c.

ARTIFICIAL KEY TO THE NATURAL ORDERS

OF ALL THE PLANTS DESCRIBED IN THIS WORK, FOUNDED ON SOME OF THE EASIEST CHARACTERS, CHIEFLY THOSE FURNISHED BY THE FLOWER.

SERIES I. PHÆNOGAMOUS OR FLOWERING PLANTS: those producing real flowers and seeds.

CLASS I. DICOTYLEDONOUS OR EXOGENOUS PLANTS.

Stems formed of bark, wood, and pith; the wood forming a layer between the other two, and increasing, when the stem continues from year to year, by the annual addition of a new layer to the outside, next the bark. Leaves netted-veined. Embryo with a pair of opposite cotyledons, or in Subclass II. often 3 or more in a whorl. Parts of the flower mostly in fours or fives.

SUBCLASS I. ANGIOSPERMÆ. Pistil consisting of a closed ovary which contains the ovules and the seeds.

DIVISION I. POLYPETALOUS: the calyx and corolla both present; the latter of *separate* petals.

A. *Stamens numerous, at least more than twice as many as the 4-9 petals.*

1. *Calyx entirely free and separate from the pistil or pistils.*

* *Stamens unconnected either with the calyx or corolla, hypogynous.*

		Page
Pistils numerous, but cohering over each other on a long receptacle.	**MAGNOLIACEÆ,**	**15**
Pistils several, immersed in the upper surface of a top-shaped receptacle.	**NELUMBIACEÆ,**	**21**
Pistils more than one, wholly separate and distinct.		
Filaments scarcely any, much shorter than the anther. Trees.	**ANONACEÆ,**	**17**
Filaments longer than the anther.		
Anthers 4-celled, 4-lobed. Flowers diœcious. Woody vines.	**MENISPERMACEÆ,**	**18**
Anthers 2-celled. Flowers mostly perfect. Herbs.		
Petals and mostly the sepals also deciduous.	**RANUNCULACEÆ,**	**2**
Petals and sepals persistent after flowering.	**CABOMBACEÆ,**	**22**
Pistils only one, or 2-several more or less completely united into one.		
Ovary simple, 1-celled with one parietal placenta.		
Filaments shorter than the anthers: petals large. Podophyllum in	**BERBERIDACEÆ,**	**19**
Filaments slender. Petals smaller than the sepals.	**RANUNCULACEÆ,**	**2**
Ovary compound, 8-30-celled: ovules borne on the partitions.	**NYMPHÆACEÆ,**	**22**
Ovary compound, 1-celled, with a free central placenta.	**PORTULACACEÆ,**	**68**

Ovary compound, 1 - 5-celled, when 1-celled the 2 - several placentæ parietal.
  Sepals persistent, 4 - 7 in number.
    Leaves punctate with transparent or dark dots, all opposite. HYPERICACEÆ, 48
    Leaves not punctate, all or some of them alternate.
      Ovary and pod not lobed, 1-celled or partly so: ovules orthotropous. CISTACEÆ, 45
      Ovary and pod 3 - 7-horned or lobed, 1-celled, opening early. RESEDACEÆ, 41
      Ovary and pod 5-celled. Style umbrella-shaped. SARRACENIACEÆ, 23
  Sepals caducous, only 2 or 3. Juice milky or colored. PAPAVERACEÆ, 24
  Sepals deciduous, 5 in number, valvate in the bud. TILIACEÆ, 69

** * Stamens united with the base of the (hypogynous) petals.*

Calyx valvate in the bud. Stamens monadelphous: anthers 1-celled. MALVACEÆ, 65
Calyx imbricated in the bud. Anthers 2-celled. Trees or shrubs. CAMELLIACEÆ, 70

** * * Stamens and petals inserted on the calyx (perigynous).*

Leaves alternate, with stipules. Pistils 1 - few-seeded. ROSACEÆ, 110
Leaves opposite, no stipules. Calyx-tube enclosing the ovaries. CALYCANTHACEÆ, 126

2. *Calyx more or less coherent with the surface of the ovary; i. e. ovary inferior or partly so.*

Leaves with stipules, alternate. Pomeæ in ROSACEÆ, 110
Leaves without stipules. (In Cactaceæ there are no proper leaves.)
  Ovary 1-celled, with parietal placentæ.
    Fleshy and leafless plants: sepals and petals many, and much alike. CACTACEÆ, 136
    Rough-leaved plants: calyx-lobes 5: petals 5 or 10. LOASACEÆ, 135
  Ovary 1 - 5-celled more than half free from the calyx, with a many-seeded placenta in the axis: pod circumcissile, the upper part falling off as a lid. PORTULACACEÆ, 63
  Ovary 2-celled, half free: styles 2: pod 2-beaked, 2-seeded. HAMAMELACEÆ, 147
  Ovary 3 - 4-celled (style 1) with 1 - 4 ovules in the axis of each cell. STYRACACEÆ, 265
  Ovary 3 - 5-celled (styles separate at the top): ovules and seeds very numerous on placentæ projecting from the axis. Philadelphus in SAXIFRAGACEÆ, 141
  Ovary and berry-like pod 10 - 30-celled, many-seeded on the partitions. NYMPHÆACEÆ, 22

B. *Stamens of the same number as the petals, and opposite them.*

Pistils 3 - 6, separate. Flowers diœcious. Woody vines. MENISPERMACEÆ, 18
Pistil only one: ovary 1-celled.
  Style or stigma 1, simple: anthers opening by uplifted valves. BERBERIDACEÆ, 19
  Style and stigma 1: anthers opening lengthwise. PRIMULACEÆ, 270
  Styles 5. Calyx funnel-form, dry. Ovule and seed solitary. PLUMBAGINACEÆ, 270
  Style 3-cleft at the apex. Calyx 2-leaved. Seeds few. PORTULACACEÆ, 63
Pistil only one: ovary 2 - 4-celled.
  Calyx very short, 4 - 5-toothed, or the limb obsolete. Petals valvate. VITACEÆ, 77
  Calyx 4 - 5-cleft, valvate in the bud. Petals involute. RHAMNACEÆ, 78

C. *Stamens when of the same number as the petals alternate with them, sometimes twice as many, sometimes fewer.*

1. *Calyx free from the ovary.*

** Leaves punctate with transparent (or sometimes blackish) dots.*

Flowers perfect. Leaves entire and simple, opposite. HYPERICACEÆ, 48
Flowers diœcious or polygamous. Leaves compound or divided. RUTACEÆ, 74

** * Leaves not punctate with transparent dots.*

+– Pistils one or more, simple, i. e. of one carpel.

Stamens inserted on the receptacle (hypogynous). Stipules none.
  Flowers diœcious. Fruit a drupe. Woody climbers. MENISPERMACEÆ, 18
  Flowers mostly perfect. Herbs, rarely somewhat shrubby plants. RANUNCULACEÆ, 2
Stamens inserted on the base or tube of the calyx (perigynous).
  Flower mostly papilionaceous or otherwise irregular. Pistil only one. LEGUMINOSÆ, 83
  Flower regular. Pistils 1 - several.

Leaves with stipules. Seeds single or few, destitute of albumen. ROSACEÆ, 110
Leaves destitute of stipules. Seeds with albumen.
Pistils 2, fewer than the (5, or rarely 4) petals. SAXIFRAGACEÆ, 142
Pistils 3-5, of the same number as the petals. CRASSULACEÆ, 139
Stamens connected with the stigma, which unites the tops of 2 pistils. ASCLEPIADACEÆ, 350

← ← *Pistil one, compound; the ovary 1-celled.*

Corolla irregular, of 4 petals. Stamens 6, collected in two sets. FUMARIACEÆ, 26
Corolla irregular, of 5 petals. Stamens 5; their broad anthers united. VIOLACEÆ, 41
Corolla regular: ovule solitary from the base. Leaves alternate. ANARCARDIACEÆ, 76
Corolla regular: ovules from the base or axis. Leaves opposite. CARYOPHYLLACEÆ, 53
Corolla regular: ovules few or many on 2-several parietal placentæ.
Stamens monadelphous, their tube sheathing the stalk of the ovary. PASSIFLORACEÆ, 133
Stamens separate, inserted on the calyx. SAXIFRAGACEÆ, 141
Stamens separate, inserted on the receptacle.
Sepals 2, caducous. Juice milky or colored. PAPAVERACEÆ, 24
Sepals 4, deciduous. Style 1. Juice not milky. CAPPARIDACEÆ, 40
Sepals 5, or sometimes 3, persistent.
A cluster of sterile filaments placed before each petal. PARNASSIACEÆ, 48
Sterile filaments or appendages none.
Styles 6 or 10, double the number of the placentæ. DROSERACEÆ, 47
Style 1 or none: stigmas 1-3: placentæ 3. CISTACEÆ, 45

← ← ← *Pistil one, compound; the ovary 2-10-celled.*

↔ *Flowers irregular.*

Stamens 6 or 8 in two sets, connected with the petals: anthers 1-celled. POLYGALACEÆ, 85
Stamens 10, distinct, free from the petals: anthers 2-celled. Rhodora in ERICACEÆ, 245
Stamens 6-8, distinct, free from the petals: anthers 2-celled. SAPINDACEÆ, 82
Stamens 5: anthers conniving over the stigma, 2-celled. BALSAMINACEÆ, 78

↔ ↔ *Flowers regular or nearly so.*

Stamens (mostly 2) fewer than the 4 petals. OLEACEÆ, 356
Stamens more numerous than the petals, but not twice as many.
Of equal length. Corolla not cruciform. ACERINEÆ, 84
Two stamens shorter than the 4 others. Corolla (of 4 petals) cruciform. CRUCIFERÆ, 28
Stamens just as many or twice as many as the petals.
Ovules and seeds only 1 or 2 in each cell.
Herbs. Flowers monœcious. Styles fewer than the sepals. EUPHORBIACEÆ, 385
Herbs. Styles or stigmas as many as the petals or sepals.
Sepals, petals, and lobes of the ovary 3. Stamens 6. LIMNANTHACEÆ, 74
Sepals and petals 5. Ovary and pod 10-celled. LINACEÆ, 70
Sepals, petals, and cells of the ovary 5. Stamens 10 or 5. GERANIACEÆ, 72
Shrubs or trees.
Fruit a fleshy colored pod. Seeds enclosed in a pulpy aril. CELASTRACEÆ, 81
Fruit 2-winged. Leaves opposite. Aril none. ACERINEÆ, 84
Fruit a 4-8-seeded drupe. Leaves alternate. AQUIFOLIACEÆ, 263
Ovules (and usually seeds) several or many in each cell.
Stipules between the opposite and simple leaves. ELATINACEÆ, 53
Stipules between the opposite and compound leaves. STAPHYLEACEÆ, 82
Stipules none when the leaves are opposite.
Stamens 5, monadelphous in a 10-toothed tube or cup. GALACINEÆ, 262
Stamens 10, monadelphous at the base. OXALIDACEÆ, 71
Stamens distinct, free from the calyx.
Style 1, undivided. ERICACEÆ, 245
Styles 2-5, separate CARYOPHYLLACEÆ, 52
Stamens distinct, inserted on the calyx.
Style 1. Pod enclosed in the calyx becoming 1-celled. LYTHRACEÆ, 127
Styles 2 (rarely 3), or splitting into 2 in fruit. SAXIFRAGACEÆ, 141

2. *Calyx-tube adherent to the ovary, at least to its lower half.*

Stamens more or less united together. Tendril-bearing herbs.	CUCURBITACEÆ, 133
Stamens distinct. Not tendril bearing.	
Ovules and seeds more than one in each cell.	
Ovary 1-celled, many-ovuled from the base.	PORTULACACEÆ, 63
Ovary 1-celled, with 2 or 3 parietal few-many-seeded placentæ.	Some SAXIFRAGACEÆ, 141
Ovary 2-5-celled.	[and GROSSULACEÆ, 136
Anthers opening by pores at the apex. Style 1.	MELASTOMACEÆ, 127
Anthers opening lengthwise.	
Style 1. Petals 4, rarely 2.	ONAGRACEÆ, 129
Styles 2, rarely 3.	SAXIFRAGACEÆ, 141
Ovules and seeds only one in each cell.	
Stamens (in perfect flowers) inserted on the tube of the calyx.	
Stipules deciduous. Pod 2-beaked.	HAMAMELACEÆ, 147
Stipules present or deciduous. Fruit globular, fleshy.	POMEÆ, 123
Stipules none.	ONAGRACEÆ, 129
Stamens inserted on a disk which crowns the top of the ovary.	
Styles 2. Herbs. Flowers umbelled. Fruit dry.	UMBELLIFERÆ, 148
Styles 2-5. Flowers umbelled. Fruit fleshy.	ARALIACEÆ, 159
Style 1. Shrubs or trees. Flowers clustered.	CORNACEÆ, 161

DIVISION II. MONOPETALOUS: calyx and corolla both present; the latter with its petals united more or less into one piece.

A. *Stamens more numerous than the lobes of the corolla.*

* *Ovary compound, 3-many-celled, or 1-celled with the ovules rising from the base.*

Stamens free or nearly free from the corolla, distinct.	ERICACEÆ, 245
Stamens borne on or adherent to the base of the tube of the corolla.	
Filaments wholly distinct. Calyx wholly free from the ovary.	EBENACEÆ, 266
Filaments 1-5-adelphous below: anthers 2-celled.	
Calyx adherent to the base or to the whole surface of the ovary.	STYRACACEÆ, 265
Calyx wholly free from the ovary.	CAMELLIACEÆ, 70
Filaments monadelphous in a column: anthers 1-celled.	MALVACEÆ, 65
* * *Ovary compound, 1-celled, with 2 parietal placentæ.*	FUMARIACEÆ, 28
* * * *Ovary simple, with 1 parietal (sutural) placenta.*	LEGUMINOSÆ, 88

B. *Stamens (i. e. fertile stamens) as many as the lobes of the corolla, and opposite them.*

Ovary 5-celled. Corolla appendaged with scales inside.	SAPOTACEÆ, 267
Ovary 1-celled: utricle 1-seeded. Styles 5.	PLUMBAGINACEÆ, 270
Ovary 1-celled: pod several-many-seeded. Style 1.	PRIMULACEÆ, 270

C. *Stamens as many as the lobes of the corolla and alternate with them, or fewer.*

* *Ovary adherent to the calyx-tube (inferior).*

Stamens united by their anthers into a ring or tube.	
Flowers collected in a head which is furnished with an involucre.	COMPOSITÆ, 177
Flowers separate, perfect, irregular. Corolla cleft down one side.	LOBELIACEÆ, 241
Flowers separate, monœcious or diœcious, regular.	CUCURBITACEÆ, 133
Stamens separate.	
Leaves alternate, without stipules. Juice milky. Pod 2-5-celled.	CAMPANULACEÆ, 243
Leaves opposite with intervening stipules, or whorled without them.	RUBIACEÆ, 168
Leaves opposite without stipules.	
Flowers not involucrate. Stamens 4 or 5. Corolla 4-5-lobed.	CAPRIFOLIACEÆ, 163
Flowers not involucrate. Stamens 2 or 3. Corolla 5-lobed.	VALERIANACEÆ, 174
Flowers in an involucrate head. Stamens and corolla-lobes 4.	DIPSACEÆ, 176

* * *Ovary free from the calyx (superior).*

← *Flowers irregular. Perfect stamens almost always less than 5.*

Ovules and mostly the seeds numerous, or sometimes only 2, in each cell.	
Pod 1-celled, with a free central placenta. Stamens 2.	LENTIBULACEÆ, 275
Pod 1-celled with 2-4 parietal placentæ. Stamens 4. Leafless plants.	OROBANCHACEÆ, 279
Pod falsely 2-5-celled: placentæ parietal. Seeds without albumen.	BIGNONIACEÆ, 277
Pod 2-celled with the placentæ in the axis.	
Seeds numerous, sometimes few, with copious albumen.	SCROPHULARIACEÆ, 281
Seeds few in each cell, flat, entirely destitute of albumen.	ACANTHACEÆ, 296
Ovules and seeds (4, rarely 1) one in each cell.	
Ovary deeply 4-lobed; the style rising from between the lobes.	LABIATÆ, 300
Ovary not lobed; the style terminal.	VERBENACEÆ, 298

← ← *Flowers regular; stamens as many as the lobes of the corolla or calyx.*

Ovary deeply divided around the single style into 4 one-ovuled lobes.	BORRAGINACEÆ, 319
Ovary 1-celled, with the ovules or placentæ parietal.	
Leaves toothed or cut, often rough-hairy, petioled.	HYDROPHYLLACEÆ, 326
Leaves entire, sessile and opposite, glabrous. Leaves petioled, alternate, entire or with 3 entire leaflets.	GENTIANACEÆ, 341
Ovary 2-10-celled.	
Style none. Corolla deeply 4-6-parted. Shrubs or trees.	AQUIFOLIACEÆ, 263
Style present. Plants with green herbage.	
Stamens 4. Pod circumcissile, and the partition loose.	PLANTAGINACEÆ, 268
Stamens 5, nearly or quite free from the corolla.	ERICACEÆ, 245
Stamens 5, borne on the corolla.	
Stipules present between the bases of opposite leaves.	LOGANIEÆ, 174
Stipules none.	
Leaves opposite. Pod 2-celled, with several winged seeds.	GELSEMINEÆ, 283
Leaves opposite or alternate. Pod 3-celled, few-seeded.	POLEMONIACEÆ, 329
Leaves alternate Pod or berry many-seeded.	SOLANACEÆ, 338
Leaves alternate. Pod 2-6-seeded. Style present. Plants destitute of green foliage. **Ovaries 2, separate; their styles and stigmas also separate.**	CONVOLVULACEÆ, 332
Ovaries 2, separate, but united at the top by a common stigma.	
Filaments distinct: pollen powdery, in ordinary anthers.	APOCYNACEÆ, 349
Filaments mostly monadelphous: pollen cohering in masses.	ASCLEPIADACEÆ, 350

← ← ← *Flowers regular: stamens fewer than the lobes of the corolla.*

Low herbs. Pod circumcissile, 4-many-seeded: partition separating.	PLANTAGINACEÆ, 268
Shrubs. Drupe or berry 1-2-seeded.	OLEACEÆ, 356

DIVISION III. APETALOUS: corolla (and sometimes the calyx) wanting.

A. *Flowers not in catkins.*

* *Ovary or cells of the ovary containing many ovules.*

Ovary and pod 6-celled, inferior (calyx-tube adherent).	ARISTOLOCHIACEÆ, 359
Ovary and pod 4-celled, inferior.	Ludwigia in ONAGRACEÆ, 129
Ovary and pod 3-5-celled, superior (calyx free).	
Pod 5-beaked, opening across the beaks.	Penthorum in CRASSULACEÆ, 139
Pod beakless, circumcissile. Leaves fleshy.	Sesuvium in PORTULACACEÆ, 63
Pod beakless, 3-valved. Leaves whorled.	MOLLUGINEÆ, 54
Ovary 2-celled, superior. Flowers perfect, separate.	
Calyx enclosing the thin (at length often 1-celled) pod.	Ammannia in LYTHRACEÆ, 127
Calyx none. Pod many-ribbed. Aquatic herbs.	PODOSTEMACEÆ, 384
Ovary 2-celled. Flowers imperfect, capitate.	Liquidambar in HAMAMELACEÆ, 143
Oavry 1, compound, but only one-celled.	
Placentæ 2, parietal	Chrysosplenium in SAXIFRAGACEÆ, 141

Placenta in the axis or the base of the cell.
Stamens 5, alternate with the 5 sepals. Glaux in PRIMULACEÆ, 270
Stamens opposite the sepals when of the same number. CARYOPHYLLACEÆ, 52

* * *Ovary or its cells containing only* 1 *or* 2 (*rarely* 3) *ovules.*

+ *Pistils more than one, and distinct or nearly so.*

Stamens inserted on the calyx. Leaves with stipules. ROSACEÆ, 110
Stamens inserted on the receptacle.
Leaves punctate, with pellucid dots. Ovaries stalked. Zanthoxylum in RUTACEÆ, 74
Leaves not dotted.
Calyx present, usually colored or petal-like. RANUNCULACEÆ, 2
Calyx absent. Flowers entirely naked, but perfect, spiked. SAURURACEÆ, 383

+ + *Pistil one, compound: ovary* 2 - 10-*celled.*

Ovary coherent with the calyx-tube (inferior), 3 - 4-celled. HALORAGEÆ, 129
Ovary free. (Calyx sometimes wanting.)
Herbs, aquatic. Fruit 4-celled, indehiscent, nut-like: styles 2. CALLITRICHACEÆ, 384
Herbs. Fruit splitting into 2 or 3 two-valved pods. EUPHORBIACEÆ, 385
Herbs. Fruit a 10-celled and 10-seeded berry. PHYTOLACCACEÆ, 361
Heath-like undershrubs. Drupe 3 - 9-celled. EMPETRACEÆ, 393
Shrubs or trees. Fruit a berry-like drupe or a samara.
Ovule solitary in each cell, erect.. Stamens alternate with the sepals. RHAMNACEÆ, 78
Ovule solitary in each cell, suspended. ULMACEÆ, 394
Ovules a pair in each cell: these
Horizontal or ascending. Fruit a double samara. ACERINEÆ, 82
Suspended or pendulous. Fruit a single samara or a drupe. OLEACEÆ, 356

+ + + *Pistil one* (*simple or compound*), 1-*celled*, 1-*seeded.*

Ovary coherent with the calyx-tube.
Stigma extending down the whole length of one side of the style.
Stamen 1. Aquatic herbs. Seed suspended. Hippuris in HALORAGEÆ, 129
Stamens 5 - 10. Trees. Seed suspended. Nyssa in CORNACEÆ, 160
Stigma terminal, with or without a style.
Anthers 3 - 4, sessile. Woody parasites on trees. LORANTHACEÆ, 382
Anthers 5, on filaments. SANTALACEÆ, 381
Ovary free, sometimes enclosed in the calyx-tube, but not adherent to it.
Stipules forming closed sheaths at the joints.
Calyx conspicuous, often colored or petal-like. Herbs. POLYGONACEÆ, 371
Calyx none. Trees: flowers in heads. PLATANACEÆ, 409
Stipules not sheathing, often none
Stamens 3 - 24, more numerous than the lobes of the calyx.
Anthers opening by uplifted valves. Leaves pellucid-dotted. LAURACEÆ, 378
Anthers opening lengthwise
Shrubs, with dotless and silvery-scurfy leaves. ELÆAGNACEÆ, 380
Shrubs, with entire and dotless leaves. THYMELACEÆ, 380
Aquatic herbs, with finely dissected leaves. CERATOPHYLLACEÆ, 383
Stamens 1 - 6, equalling or fewer than the calyx-lobes.
Embryo coiled around the outside of the albumen.
Flowers scarious-bracted. AMARANTACEÆ, 367
Flowers not scarious-bracted.
Calyx colored, imitating a monopetalous corolla. NYCTAGINACEÆ, 360
Calyx herbaceous or scarious. CHENOPODIACEÆ, 361
Embryo coiled or bent, without albumen. }
Embryo straight in the axis of albumen. } URTICACEÆ, 394
Radicle superior. Style and stigma 1. }
Radicle inferior. Stigmas 3, two-cleft. EUPHORBIACEÆ, 385
Embryo straight: albumen none.
Flowers polygamous. Planera, &c. in URTICACEÆ, 394
Flowers perfect. Stamens on the calyx. ROSACEÆ, 110

B. *Flowers (monœcious or diœcious) one or both sorts in catkins.*

* *Only one sort of flowers in catkins or catkin-like heads.*

Fertile flowers forming a short catkin or strobile in fruit.	Humulus in URTICACEÆ, 394
Fertile flowers single or clustered: sterile ones in slender catkins.	
Nut in an involucre or cup. Leaves simple.	CUPULIFERÆ, 403
Dry drupe naked, with no involucre. Leaves pinnate.	JUGLANDACEÆ, 401

* * *Both the sterile and fertile flowers in catkins or heads.*

Fruit a thin dehiscent pod. Seeds numerous, downy-tufted.	SALICACEÆ, 413
Fruit a woody pod. Seeds naked.	Liquidambar in HAMAMELACEÆ, 148
Fruit a berried drupe or drupe-like. Ovary 1-celled, 1-ovuled.	
Parasitic: leaves opposite, thick.	LORANTHACEÆ, 382
Not parasitic: leaves alternate, fragrant.	MYRICACEÆ, 409
Fruit, i. e. the pericarp itself, a nutlet or achenium.	
Nutlets winged or oblong, under dry or woody scales.	BETULACEÆ, 410
Nutlets club-shaped, naked, plumose-hairy below.	PLATANACEÆ, 400
Achenia thin, surrounded by an herbaceous or often juicy calyx.	URTICACEÆ, 394.

SUBCLASS II. GYMNOSPERMÆ. Pistil an open scale or altered leaf, bearing naked ovules on its margin or upper surface, or in Taxus entirely wanting.

Flowers monœcious or diœcious. Stems branched. Leaves simple.	CONIFERÆ, 420

CLASS II. MONOCOTYLEDONOUS OR ENDOGENOUS PLANTS.

Stems with the wood collected into separate bundles or threads, which are irregularly dispersed throughout the whole diameter, leaving no distinct pith in the centre; not forming annual layers. Leaves mostly parallel-veined. Embryo with a single cotyledon, and the first leaves alternate. Parts of the flower generally in threes.

A. *Flowers destitute of any proper floral envelopes (either calyx or corolla), and also of glumes like those of Grasses and Sedges, mostly aggregated on a spadix.*

1. *Terrestrial or aquatic, with root, stem, and leaves.*

Fruit a 1-few-seeded berry. Spathe conspicuous.	ARACEÆ, 426
Fruit a dry nutlet. Flowers densely spiked or capitate. Marsh herbs.	TYPHACEÆ, 429
Fruit a nutlet, drupe, or utricle. Immersed aquatics.	NAIADACEÆ, 431

2. *Floating free: no distinction of stem and foliage.*

Flowers bursting from the edge of a floating frond.	LEMNACEÆ, 430

B. *Flowers with true floral envelopes (perianth) representing the calyx or calyx and corolla.*

1. *Flowers densely crowded on a spadix.*	Certain ARACEÆ, 426, and NAIADACEÆ, 431

2. *Flowers solitary, clustered, or variously disposed, but not collected on a spadix.*

* *Perianth adherent to the ovary or to its base.*

Flowers diœcious or polygamous, regular.	
Aquatics. Fruit fleshy, indehiscent.	HYDROCHARIDACEÆ, 440
Climbers, veiny-leaved. Pod 3-winged.	DIOSCOREACEÆ, 460
Flowers perfect. (Pod several-many-seeded)	
Stamens 1 or 2, gynandrous. Pod 1-celled with 3 parietal placentæ.	ORCHIDACEÆ, 442
Stamens 3, before the outer divisions of the perianth. Pod 3-celled.	
Anthers turned inwards.	BURMANNIACEÆ, 442
Anthers turned outwards.	IRIDACEÆ, 4[illegible]
Stamens 3, before the inner divisions of the perianth. } Stamens 6. Perianth free except the base.	HÆMODORACEÆ, 457

Stamens 6. Perianth adherent to the whole ovary. AMARYLLIDACEÆ, 455

* * *Perianth free from the ovary:*

+- *Its 6 or rarely 4 divisions similar, not glumaceous nor furnished with glumaceous bracts.*

Anthers turned inwards.
  Stamens 3, or when more unlike or sterile. Style 1. PONTEDERIACEÆ, 458
  Stamens 6, rarely 5 or 7. Styles 2-3, separate. Flowers diœcious. SMILACEÆ, 461
  Stamens 6, rarely 4. Styles united into one. LILIACEÆ, 126
Anthers turned outwards (except Tofieldia).
  Seeds with albumen. Leaves grass-like or with a proper blade. MELANTHACEÆ, 472
  Seeds without albumen. Leaves rush-like, without a blade. JUNCAGINEÆ, 436

+- +- *Its 6 divisions similar and glumaceous* (except Narthecium). JUNCACEÆ, 479

+- +- +- *Its divisions of two kinds, viz. 3 herbaceous or membranaceous sepals and 3 colored petals; not furnished with glumaceous bracts.*

Pistils numerous, distinct. Stamens from 6 to many. ALISMACEÆ, 436
Pistil (ovary) one, 3-celled, many-several-seeded.
  Styles 1. Thick or scurfy-leaved epiphytes. BROMELIACEÆ, 458
  Styles or sessile stigmas 3. Leaves whorled. TRILLIACEÆ, 461
Pistil (ovary) one, 2-3-celled; the cells 1-2-seeded. COMMELYNACEÆ, 485
Pistil 1: ovary 1-celled, with parietal placentæ. XYRIDACEÆ, 487

+- +- +- +- *Its divisions of two kinds, or the inner* (*corolla*) *rarely wanting; the outer* (*calyx*) *mostly glumaceous or chaffy; the flowers also furnished with glumaceous or chaffy bracts. Rush-like herbs: flowers in dense heads.*

Pod 1-celled, many-seeded, with 3 parietal placentæ. XYRIDACEÆ, 487
Pod 2-3-celled, 2-3-seeded. ERIOCAULONACEÆ, 488

C. *Flowers destitute of any proper perianth, except sometimes small scales or bristles, but covered by glumes, i. e. husk-like or scale-like bracts.*

Glume a single scale-like bract with a flower in its axil. CYPERACEÆ, 490
Glumes in pairs, of two sorts. GRAMINEÆ, 535

SERIES II. CRYPTOGAMOUS OR FLOWERLESS PLANTS: those destitute of stamens and pistils, in fructification producing *spores* instead of seeds.

CLASS III. ACROGENOUS PLANTS.

Plants with a stem containing woody tissue and vessels, as does the foliage when there is any (in the form of veins).

Fructification borne on the leaves (fronds), commonly on their backs or margins. FILICES, 587
Fructification of several spore-cases borne on the under side of the shield-shaped stalked scales of a terminal spike or cone. Leaves none, except a whorl of teeth at each joint of the stem. EQUISETACEÆ, 585
Fructification of spore-cases in the axil of small simple leaves or bracts. LYCOPODIACEÆ, 602
Fructification at the base of leaves or naked branches. Aquatics. HYDROPTERIDES, 605

CLASS IV. ANOPHYTES. (MOSSES.)

Plants consisting of cellular tissue only, with stem and foliage distinct, or sometimes the two confluent into a foliaceous body (frond).

Spore-cases mostly opening by a lid. Leaves distinct. MUSCI, 607
Spore-cases not opening by a lid. Leaves distinct or confluent into a frond. HEPATICÆ, 652

BOTANY

OF THE

NORTHERN UNITED STATES.

SERIES I.

PHÆNÓGAMOUS OR FLOWERING PLANTS.

Vegetables bearing proper flowers, that is, having stamens and pistils, and producing seeds, which contain an embryo.

Class I. DICOTYLÉDONOUS OR EXÓGENOUS PLANTS.

Stems formed of bark, wood, and pith; the wood forming a layer between the other two, increasing, when the stem continues from year to year, by the annual addition of a new layer to the outside, next the bark. Leaves netted-veined. Embryo with a pair of opposite cotyledons, or rarely several in a whorl. Flowers having their parts usually in fives or fours.

Subclass I. ANGIOSPÉRMÆ.

Pistil consisting of a closed ovary, which contains the ovules and forms the fruit. Cotyledons only two.

DIVISION I. POLYPÉTALOUS EXÓGENOUS PLANTS.

Floral envelopes double, that is, consisting of both calyx and corolla; the petals not united with each other.*

ORDER 1. RANUNCULÀCEÆ. (CROWFOOT FAMILY.)

Herbs (or woody vines) with a colorless acrid juice, polypetalous, or apetalous with the calyx often colored like a corolla, hypogynous; the sepals, petals, numerous stamens, and many or few (rarely single) pistils all distinct and unconnected. — Flowers regular or irregular. Sepals 3 – 15. Petals 3 – 15, or wanting. Stamens indefinite, rarely few: anthers short. Fruits either dry pods, or seed-like (achenia), or berries, 1 – several-seeded. Seeds anatropous, with fleshy albumen and a minute embryo. — Stipules none. Leaves mostly dissected, their stalks dilated at the base. (A large family, mostly of acrid plants, some of them acrid-narcotic poisons.)

Synopsis of the Genera.

TRIBE I. **CLEMATIDEÆ.** Sepals valvate in the bud, or with the edges bent inwards. Petals none, or small and stamen-like. Achenia numerous, tailed with the feathery or hairy styles. Seed solitary, suspended. — Vines: leaves all opposite.

1. ATRAGENE. Petals several, small, and resembling sterile stamens.
2. CLEMATIS. Petals none.

TRIBE II. **ANEMONEÆ.** Sepals imbricated in the bud. Petals none, or very small and stamen-like. Achenia numerous or several. Seed solitary. — Stem-leaves often opposite or whorled, forming an involucre.

* Seed suspended.

3. PULSATILLA. Achenia bearing long plumose tails. Petals resembling sterile stamens.
4. ANEMONE. Achenia merely pointed, numerous, not ribbed nor inflated. Involucre remote from the flower, and resembling the other leaves.
5. HEPATICA. Achenia several, not ribbed. Involucre close to the flower, of 3 simple leaves, and resembling a calyx.
6. THALICTRUM. Achenia 4 - 10, ribbed, grooved, or inflated. Involucre none, or leaf-like.

* * Seed erect.

7. TRAUTVETTERIA. Achenia inflated and 4-angled. Involucre none.

TRIBE III. **RANUNCULEÆ.** Sepals imbricated in the bud. Petals evident, often with a scale or pore inside. Achenia numerous. Seed solitary.

8. RANUNCULUS. Sepals not appendaged. Achenia in a head. Seed erect.
9. MYOSURUS. Sepals spurred at the base. Achenia in a long spike. Seed suspended.

TRIBE IV. **HELLEBORINEÆ.** Sepals imbricated in the bud, deciduous, rarely persistent, petal-like. Petals (*nectaries* of the earlier botanists) tubular, irregular, or 2-lipped, often none. Pods (follicles) few, rarely single, few - several-seeded. — Leaves all alternate.

* Flower regular. Pods several-seeded. Herbs.

10. ISOPYRUM. Petals none (in our species). Pods few. Leaves compound.
11. CALTHA. Petals none. Pods several. Leaves kidney-shaped.

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* In many exceptional cases some species or some genera belonging to polypetalous orders are destitute of petals; as Clematis, Anemone, our Isopyrum, and other plants of the Crowfoot Family.

12. **TROLLIUS.** Petals many, minute and stamen-like, hollowed near the base. Pods 8-15, sessile. Leaves divided.

13. **COPTIS.** Petals 5-6, small, hollowed at the apex. Pods 3-7, long-stalked. Sepals deciduous. Leaves divided.

14. **HELLEBORUS.** Petals 8-10, small, tubular, 2-lipped. Pods several, sessile. Sepals 5, persistent, turning green with age.

15. **AQUILEGIA.** Petals 5, spur-shaped, longer than the 5 deciduous sepals. Pods 5.

* * Flower unsymmetrical and irregular. Pods several-seeded.

16. **DELPHINIUM.** Upper sepal spurred. Petals 4, of two forms; the upper pair with long spurs, enclosed in the spur of the calyx.

17. **ACONITUM.** Upper sepal hooded, covering the 2 long-clawed petals.

* * * Flower symmetrical. Pods ripening only one seed. Shrubby.

18. **ZANTHORHIZA.** Petals 5, small, 2-lobed, with claws. Stamens few. Flowers in drooping compound racemes, polygamous.

TRIBE V. CIMICIFUGEÆ. Sepals imbricated, falling off as the flower opens. Petals small and flat, or none. Pistils 1-several. Fruit a 2-several-seeded pod or berry. Leaves all alternate.

19. **HYDRASTIS.** Flower solitary. Pistils several in a head, becoming berries in fruit, 2-seeded. Leaves simple, lobed. Petals none.

20. **ACTÆA.** Flowers in a single short raceme. Pistil single, forming a many-seeded berry. Leaves 2-3-ternately compound. Petals manifest.

21. **CIMICIFUGA.** Flowers in long spiked racemes. Pistils 1-8, in fruit forming dry several-seeded pods. Leaves 2-3-ternately compound.

1. ATRÁGENE, L. ATRAGENE.

Sepals 4, colored, their valvate margins slightly turned inwards in the bud. Petals several, much smaller than the sepals, passing gradually into stamens. Achenia numerous in a head, bearing the persistent styles in the form of long plumose tails.—Perennial vines, climbing by the leafstalks; stems a little woody. Buds scaly. Leaves opposite, compound. Peduncles 1-flowered. (A name of obscure derivation, given to a climbing plant by Theophrastus.)

1. **A. Americàna,** Sims. (AMERICAN ATRAGENE.) Leaflets stalked, ovate, pointed, entire or a little toothed, sometimes slightly heart-shaped. (Clematis verticillàris, *DC.*)—Shady rocky hills, Maine and Western N. England to Wisconsin, Pennsylvania, and mountains of Virginia. April, May.—From each of the opposite buds in spring arise two ternate leaves with long-stalked leaflets, and a peduncle which bears a bluish-purple flower, 2-3 inches across.

2. CLÉMATIS, L. VIRGIN'S-BOWER.

Sepals 4, colored, the valvate margins turned inwards in the bud. Petals none. Achenia numerous in a head, bearing the persistent styles as naked, hairy, or plumose tails.—Perennial herbs or vines, a little woody, and climbing by the twisting of the leafstalks. Leaves opposite. (Κληματίς, a name of Dioscorides for a climbing plant with long and lithe branches.)

* *Peduncles bearing single large nodding flowers: calyx leathery: anthers linear.*

+- *Stem erect and mostly simple: calyx silky outside.*

1. **C. ochroleùca,** Ait. Leaves simple and entire, ovate, almost sessile, silky beneath, reticulated and soon smooth above; tails of the fruit very plu-

mose. — Copses near Brooklyn, New York; Pennsylvania and Virginia: rare. May. — A foot high. Calyx yellowish within.

+- +- *Stems climbing: leaves pinnate: calyx (and foliage) glabrous or puberulent.*

2. **C. Viórna,** L. (LEATHER-FLOWER.) Calyx ovate and at length bell-shaped; the purplish *sepals very thick and leathery,* with abrupt edges, *tipped with short recurved points;* the long tails of the *fruit very plumose;* leaflets 3 – 7, ovate or oblong, sometimes slightly cordate, 2 – 3-lobed or entire; uppermost leaves often simple. — Rich soil, Penn., Ohio, and southward. May – Aug.

3. **C. Pitcheri,** Torr. & Gray. Calyx bell-shaped; the dull purplish *sepals with narrow and slightly margined recurved points; tails of the fruit filiform and barely pubescent;* leaflets 3 – 9, ovate or somewhat cordate, entire or 3-lobed, much reticulated; uppermost leaves often simple. — Illinois, on the Mississippi, and southward. June.

4. **C. cylindrica,** Sims. Calyx cylindraceous below, the upper half of the bluish-purple *sepals dilated* and widely spreading, with *broad and wavy thin margins; tails of the fruit silky;* leaflets 5 – 9, thin, varying from oblong-ovate to lanceolate, entire or 3 – 5-parted. — Virginia near Norfolk, and southward. May – Aug.

* * *Flowers in panicled clusters: sepals thin: anthers oblong.*

5. **C. Virginiàna,** L. (COMMON VIRGIN'S-BOWER.) Smooth; leaves bearing 3 ovate acute leaflets, which are cut or lobed, and somewhat heart-shaped at the base; tails of the fruit plumose. — River-banks, &c., common; climbing over shrubs. July, August. — The axillary peduncles bear clusters of numerous white flowers (sepals obovate, spreading), which are polygamous or diœcious; the fertile are succeeded in autumn by the conspicuous feathery tails of the fruit.

3. PULSATÍLLA, Tourn. PASQUE-FLOWER.

Sepals 4 – 6, colored. Petals none, or like abortive gland-like stamens. Achenia with long feathery tails. Otherwise as Anemone; from which the genus does not sufficiently differ. (Derivation obscure. The popular name was given because the plant is in blossom at Easter.)

1. **P. Nuttalliàna.** Villous with long silky hairs; flower erect, developed before the leaves; which are ternately divided, the lateral divisions 2-parted, the middle one stalked and 3-parted, the segments deeply once or twice cleft into narrowly linear and acute lobes; lobes of the involucre like those of the leaves, at the base all united into a shallow cup; sepals 5 – 7, purplish, spreading. (P. patens, ed. 1. Anemone patens, *Hook, &c.* not of *L.* A. Nuttalliana, *DC.* A. Ludoviciana, *Nutt.*) — Prairies, Wisconsin (*Lapham*) and westward. April. — A span high. Sepals 1′ – 1½′ long. Tails of the fruit 2′ long. More like P. vulgaris than P. patens of Europe.

4. ANEMÒNE, L. ANÉMONE. WIND-FLOWER.

Sepals 5 – 15, petal-like. Petals none. Achenia short-beaked or blunt. Seed suspended. — Perennial herbs with radical leaves; those of the stem 2 or 3 together, opposite or whorled, and forming an involucre remote from the flower. (Name from ἄνεμος, the *wind*, because the flower was thought to open only when the wind blows.)

* *Pistils many, crowded in a very dense head, clothed with long matted wool in fruit: sepals downy or silky underneath.*

1. **A. parviflòra,** Michx. (SMALL ANEMONE.) Somewhat pubescent; stem slender and simple, one-flowered; leaves roundish, 3-parted, their *divisions wedge-shaped*, crenate-lobed; involucre of 2 almost sessile leaves; sepals 6, oval, whitish; *head of fruit globular.* — Lake Superior; thence northward. Plant 2′ - 12′ high.

2. **A. multifida,** DC. (MANY-CLEFT ANEMONE.) Silky-hairy; principal involucre 2 - 3-leaved, bearing one naked and one or two 2-leaved peduncles; leaves of the *involucre short-petioled*, similar to the root-leaves, twice or thrice 3-parted and cleft, their *divisions linear; sepals* 5 - 8, *obtuse*, red, sometimes greenish-yellow or whitish; *head of fruit spherical or oval.* — Rocks, Western Vermont and Northern New York, Lake Superior, &c.: rare. June. — Plant 6′ - 12′ high: sepals ½′ long.

3. **A. cylíndrica,** Gray. (LONG-FRUITED ANEMONE.) Slender, clothed with silky hairs; flowers 2 - 6, on very long and upright naked peduncles; leaves of the *involucre long-petioled*, twice or thrice as many as the flower-stalks, 3-divided; their divisions wedge-shaped, the lateral 2-parted, the middle one 3-cleft; lobes cut and toothed at the apex; *sepals* 5, *obtuse*, greenish-white; *head of fruit cylindrical* (1′ long). — Sandy or dry woods, Massachusetts and Rhode Island to Wisconsin and Illinois. May. — Plant 1° - 2° high. Peduncles 7′ - 12′ long, all appearing together from the same involucre, and naked throughout, or sometimes part of them with involucels, as in No. 4.

4. **A. Virginiàna,** L. (TALL ANEMONE.) Hairy; principal *involucre* 3-leaved; the leaves *long-petioled*, 3-parted; their *divisions ovate-lanceolate*, pointed, cut-serrate, the lateral 2-parted, the middle 3-cleft; peduncles elongated, the earliest naked, the others with a 2-leaved involucel at the middle; *sepals* 5, *acute*, greenish (in one variety white and obtuse); *head of fruit oval or oblong.* — Woods and meadows; common. June - August. — Plant 2° - 3° high; the upright peduncles 6′ - 12′ long. In this and the next species the first flower-stalk is leafless; but from the same involucre soon proceed one or two lateral ones, which are 2-leaved at the middle; these partial involucres in turn giving rise to similar peduncles, thus producing a succession of flowers through the whole summer.

* * *Pistils fewer, in a rather loose head, hairy or pubescent.*

5. **A. Pennsylvánica,** L. (PENNSYLVANIAN ANEMONE.) Hairy, *involucres* (or stem-leaves) *sessile;* the primary ones 3-leaved, bearing a naked peduncle, and soon a pair of branches or peduncles with a 2-leaved involucre at the middle, which branch similarly in turn; leaves broadly wedge-shaped, 3-cleft, cut and toothed; radical leaves 5 - 7-parted or cleft; sepals obovate, white; head of fruit spherical; the carpels flat, orbicular, hairy. — W. New England to Ohio and Wisconsin. June - Aug. — Plant rather hairy, 6′ high when it begins to blossom, but continuing to produce branches, each terminated by a naked peduncle, through the summer; flowers 1½′ broad, handsome.

6. **A. nemorósa,** L. (WIND-FLOWER. WOOD ANEMONE.) Low, smooth; stem perfectly simple; *flower single* on a naked peduncle; leaves of the *involucre* 3, *long-petioled*, 3-divided, toothed and cut; the lateral divisions often (var. QUINQUEFOLIA) 2-parted; radical leaf single; sepals 4–7, oval, white, sometimes tinged with purple outside; carpels only 15–20, oblong, with a hooked beak.—Margin of woods. April, May.—A delicate and pretty vernal species; the spreading flower 1′ broad. (Eu.)

5. HEPÁTICA, Dill. LIVER-LEAF. HEPATICA.

Involucre simple and 3-leaved, very close to the flower, so as to resemble a calyx; otherwise as in Anemone (of which this genus may be viewed as only a section).—Leaves all radical, heart-shaped and 3-lobed, thickish and persistent through the winter, the new ones appearing later than the flowers. Flowers single, on hairy scapes. (Name from a fancied resemblance to the liver in the shape of the leaves.)

1. **H. tríloba,** Chaix. (ROUND-LOBED HEPATICA.) Leaves with 3 ovate obtuse or rounded lobes; those of the involucre also obtuse.—Woods; common; flowering soon after the snow leaves the ground in spring. Sepals 6–9, blue, purplish, or nearly white. Achenia several, in a small loose head, ovate-oblong, pointed, hairy. Lobes of the leaves usually very obtuse, or rounded. (Eu.)

2. **H. acutíloba,** DC. (SHARP-LOBED HEPATICA.) Leaves with 3 ovate and pointed lobes, or sometimes 5-lobed; those of the involucre acute or acutish.—Woods, Vermont and New York to Wisconsin. Sepals 7–12, pale purple, pink, or nearly white. Perhaps runs into No. 1.

6. THALÍCTRUM, Tourn. MEADOW-RUE.

Sepals 4 or more, petal-like or greenish. Petals none. Achenia 4–15, tipped by the stigma or short style, grooved or ribbed, or else inflated. Seed suspended.—Perennials, with 2–3-ternately compound leaves, the divisions and the leaflets stalked. Flowers in corymbs or panicles, often polygamous. (Derivation obscure.)

* *Stem-leaves forming an involucre at the summit, as in Anemone: root tuberous-thickened and clustered: flowers perfect: fruits sessile, grooved.*

1. **T. anemonoides,** Michx. (RUE-ANEMONE.) Low; root-leaves twice or thrice 3-divided; the leaflets and the long-stalked leaflets of the involucre obtusely 3-lobed at the apex; flowers few in a simple umbel. (Anemone thalictroides, *L.*, *Bigel.*)—Woods: common. April, May.—A pretty plant, more like Anemone than Thalictrum in aspect. The stem bears 2 or 3 leaves at the very summit, like those from the root, but without the common petiole, so that they seem like a whorl of long-stalked simple leaves. Sepals 7–10, half an inch long, not falling off before the stamens, white, or tinged with pink. Pistils several in a little head, tipped with a flat stigma.

* * *Stem-leaves scattered, 3–4 times compound: root fibrous: flowers diœcious or*

polygamous: sepals 4–5, falling away early: fruits sessile, tipped with long stigmas, ribbed-angled.

2. **T. dioicum,** L. (EARLY MEADOW-RUE.) *Leaves all with general petioles;* leaflets rounded and 5–7-lobed; flowers in compound panicles, greenish.—Rocky woods and hill-sides; common northward. April, May.—A foot or so high, with very pale and delicate foliage, and slender yellowish anthers on capillary filaments.

3. **T. Cornùti,** L. (MEADOW-RUE.) *Stem-leaves without general petioles;* leaflets 3-lobed at the apex, the lobes acutish; flowers in very compound large panicles, white.—Meadows and along streams. June, July.—Stem 3°–4° high, furrowed. Leaves whitish or downy beneath. Filaments slightly club-shaped; anthers oblong.

7. TRAUTVETTÈRIA, Fischer & Meyer. FALSE BUGBANE.

Sepals 4 or 5, concave, petal-like, very caducous. Petals none. Achenia numerous, in a head, membranaceous, compressed-4-angled and inflated. Seed erect.—A perennial herb, with palmately-lobed leaves, all alternate, and corymbose (white) flowers. (Dedicated to Prof. Trautvetter, a Russian botanist.)

1. **T. palmàta,** Fischer & Meyer. (Cimicifuga palmata, *Michx.*) Woods, along streams, Virginia and Kentucky along the mountains: also sparingly in Ohio and Illinois. July, Aug.—Root-leaves large, 5–9-lobed; the lobes toothed and cut. Stems 2°–3° high.

8. RANÚNCULUS, L. CROWFOOT. BUTTERCUP.

Sepals 5. Petals 5, flat, with a little pit or scale at the base inside. Achenia numerous, in a head, mostly flattened, pointed; the seed erect.—Annuals or perennials: stem-leaves alternate. Flowers solitary or somewhat corymbed, yellow, rarely white. (Sepals and petals rarely only 3, the latter often more than 5. Stamens occasionally few in number.)—(A Latin name for a little frog; also applied by Pliny to these plants, the aquatic species growing where those animals abound.)

§ 1. BATRÀCHIUM, DC.—*Petals with a pore or naked pit at the base, white, the claw yellow: achenia turgid, transversely wrinkled: aquatic perennials, with the immersed foliage dissected into capillary lobes.*

1. **R. aquátilis,** L., var. **divaricàtus.** (WHITE WATER-CROWFOOT.) Floating; leaves all immersed and similar, compoundly dissected into many capillary lobes, which are rather rigid, and all widely spreading in a horizontal plane, making an orbicular outline; petals obovate, much longer than the calyx; receptacle of fruit hispid. (R. divaricatus, *Schrank.* R. circinàtus, *Sibthorp.*)—Ponds and slow streams: common. June–Aug. (Eu.)

§ 2. *Petals with a little scale at the base (yellow in all our species).*

* *Achenia smooth.*

+ *Aquatic, perennial: immersed leaves filiformly dissected.*

2. **R. Púrshii,** Richards. (YELLOW WATER-CROWFOOT.) Stem floating, with the leaves all dissected into several times forked capillary divis-

ions; or sometimes rooting in the mud, with the emersed leaves kidney-shaped or round and variously lobed or cleft; petals 5–8, much larger than the calyx; carpels in a spherical head, pointed with a straight beak. (R. multífidus, *Pursh*, *Bigel.* R. lacustris, *Beck.*) — Stagnant water; most common northward. May–July. — Stems 2°–4° long, round and tubular. Petals bright yellow, mostly as large as in the common Buttercup.

+ + *Terrestrial: perennial, except Nos.* 6 *and* 9, *which are at least sometimes annual.*

++ *Leaves all undivided: plants glabrous.*

3. **R. alismæfòlius,** Geyer, Benth. (WATER-PLANTAIN SPEARWORT.) Stems hollow, ascending, often rooting from the lower joints; leaves lanceolate, mostly denticulate, the lowest oblong, all contracted into a margined petiole with a membranaceous dilated and half-sheathing base; petals 5–7, much longer than the calyx, bright yellow; *carpels flattened, pointed with a long and straight subulate sharp beak,* collected in a globular head. (R. Flammula & R. Lingua, Amer. authors.) — Wet or inundated places; common northward. June–Aug. Stems 1°–2° high. Leaves 3′–5′ long. Flower 5″–6″, in Oregon and California 7″–9″, broad. Carpels much larger than in the next.

4. **R. Flámmula,** L. (SPEARWORT.) Stem reclining or ascending, rooting below; leaves lanceolate or linear, or the lowest oblong-lanceolate, entire or nearly so, mostly petioled; petals 5–7, much longer than the calyx, bright yellow; *carpels turgid, mucronate with a very short and usually curved blunt point,* forming a small globular head. — Shore of L. Ontario (a small form); thence northward. June–Aug. Corolla 4″–6″ broad. (Eu.)

Var. **réptans.** (CREEPING SPEARWORT.) Much smaller and slenderer; the filiform prostrate stems rooting at all the joints. (R. reptans, *L.* R. filiformis, *Michx.*) — Gravelly or sandy banks of streams, &c. New England and Penn. to Wisconsin, northward. Stems 4′–6′ long. (Eu.)

5. **R. pusíllus,** Poir. Stem slender, ascending; *root-leaves ovate or roundish,* obtuse, entire, often rather heart-shaped, on long petioles; the lower stem-leaves similar; the uppermost becoming linear-lanceolate, obscurely toothed, scarcely petioled; *petals* 1–5, *commonly* 3, *about as long as the calyx, yellowish; stamens few* (5–10); *carpels slightly pointed or blunt,* in a globular head. — Wet places, S. New York, New Jersey, and southward near the coast. July. — Stems 5′–12′ high.

6. **R. Cymbalària,** Pursh. (SEA-SIDE CROWFOOT.) Stem sending off *long runners* from the base which are rooting and leafy at the joints; *leaves all roundish, mostly heart-shaped at the base, coarsely crenate-toothed,* rather fleshy, on long petioles; *flower-stalks* (*scapes*) *leafless,* 1–7-flowered; petals 5–8, bright yellow; *carpels in oblong heads,* very numerous, *short-beaked, striate-veined* on the sides. — Sea-shore, Maine to New Jersey. Salt springs, Salina, New York. June–Aug. — Scapes 3′–6′ high.

++ ++ *Root-leaves undivided, often cleft, but not to the base.*

7. **R. rhomboídeus,** Goldie. *Dwarf, hairy; root-leaves roundish, or rhombic-ovate,* rarely subcordate, toothed or crenate; lowest stem-leaves similar or 3–5-lobed; the upper 3–5-parted, almost sessile, the lobes linear; *carpels*

orbicular with a minute beak, in a spherical head; *petals large, exceeding the calyx.* (Also R. brevicaulis & ovàlis, *Hook.*) — Prairies, Michigan and Wisconsin. April, May. — Stems 3′–6′ high, sometimes not longer than the root-leaves. Flower deep yellow, as large as in No. 12.

8. **R. abortìvus,** L. (SMALL-FLOWERED CROWFOOT.) *Glabrous and very smooth;* primary *root-leaves round heart-shaped or kidney-form,* barely crenate, the succeeding ones often 3-lobed or 3-parted; those of the stem and branches 3–5-parted or divided, subsessile; their divisions oblong or narrowly wedge-form, mostly toothed; *carpels in a globular head, mucronate with a minute curved beak; petals shorter than the reflexed calyx.* — Shady hill-sides and along brooks, common. April–June. — Stem erect, 6′–2° high, at length branched above, the pale yellow flowers very small in proportion.

Var. **micrànthus.** *Pubescent;* root-leaves seldom at all heart-shaped, some of them 3-parted or 3-divided; divisions of the upper stem-leaves more linear and entire; peduncles more slender. (R. micranthus, *Nutt.*) — Massachusetts (near Boston, *C. J. Sprague*), Michigan, Illinois, and westward.

9. **R. sceleràtus,** L. (CURSED CROWFOOT.) Smooth and glabrous; *root-leaves 3-lobed,* rounded; lower stem-leaves 3-parted, the lobes obtusely cut and toothed, the uppermost almost sessile, with the lobes oblong-linear and nearly entire; *carpels barely mucronulate,* very numerous, *in oblong or cylindrical heads; petals scarcely exceeding the calyx.* — Wet ditches: appearing as if introduced. June–Aug. — Stem thick and hollow, 1° high. Leaves thickish. Juice acrid and blistering. Flowers small, pale yellow. (Eu.)

10. **R. recurvàtus,** Poir. (HOOKED CROWFOOT.) *Hirsute; leaves of the root and stem nearly alike, long-petioled, deeply 3-cleft,* large, the lobes broadly wedge-shaped, 2–3-cleft, cut and toothed towards the apex; *carpels in a globular head,* flat and margined, *conspicuously beaked by the long and recurved hooked styles; petals shorter than the reflexed calyx,* pale. — Woods, common. May, June. — Stem 1°–2° high.

++ ++ ++ *Leaves all ternately parted, or compound, the divisions cleft: achenia flat.*

a. *Head of carpels oblong: petals pale, not exceeding the calyx.*

11. **R. Pennsylvánicus,** L. (BRISTLY CROWFOOT.) Hirsute with rough spreading bristly hairs; stem stout, erect; divisions of the leaves stalked, somewhat ovate, unequally 3-cleft, sharply cut and toothed, acute; carpels pointed with a sharp straight beak. — Wet places, common. June–Aug. — A coarse plant, 2°–3° high, with inconspicuous flowers.

b. *Head of carpels globular: petals bright yellow, much larger than the calyx.*

12. **R. fasciculàris,** Muhl. (EARLY CROWFOOT.) Low, pubescent with close-pressed silky hairs; *root a cluster of thickened fleshy fibres; radical leaves appearing pinnate,* the long-stalked terminal division remote from the sessile lateral ones, itself 3–5-divided or parted and 3–5-cleft, the lobes oblong or linear; stems ascending; petals spatulate-oblong, twice the length of the spreading calyx; *carpels scarcely margined,* tipped with a slender straight or rather curved beak. — Rocky hills. April, May. — Plant 5′–9′ high; the bright yellow flower 1′ broad; petals rather distant, the base scarcely broader than the scale.

13. **R. rèpens**, L. (Creeping Crowfoot.) Low, hairy or nearly glabrous; *stems ascending, and some of them forming long runners;* leaves 3-divided; the divisions all stalked (or at least the terminal one), broadly wedge-shaped or ovate, unequally 3-cleft or parted and variously cut; peduncles furrowed; petals obovate, much larger than the spreading calyx; *carpels strongly margined,* pointed by a stout straightish beak. — Moist or shady places, wet meadows, &c., May – Aug. — Extremely variable in size and foliage, commencing to flower by upright stems in spring before the long runners are formed. Flowers as large as those of No. 12, or often larger. (Eu.)

14. **R. bulbòsus**, L. (Bulbous Crowfoot, Buttercups.) Hairy; *stem erect from a bulb-like base;* radical leaves 3-divided; *the lateral divisions sessile, the terminal stalked* and 3-parted, all wedge-shaped, cleft and toothed; peduncles furrowed; petals round, wedge-shaped at the base, much longer than the reflexed calyx; carpels tipped with a very short beak. — Meadows and pastures; very abundant only in E. New England; seldom found in the interior. May – July. — A foot high. Leaves appearing as if pinnate. Petals often 6 or 7, deep glossy yellow, the corolla more than an inch broad. (Nat. from Eu.)

15. **R. àcris**, L. (Tall Crowfoot, Buttercups.) Hairy; stem erect; leaves 3-divided; *the divisions all sessile* and 3-cleft or parted, their segments cut into lanceolate or linear crowded lobes; peduncles not furrowed; petals obovate, much longer than the spreading calyx. — Meadows and fields. June – Aug. — Plant twice the height of No. 14, the flower nearly as large, but not so deep yellow. — The *Buttercups* are avoided by cattle, on account of their very acrid juice, which, however, being volatile, is dissipated in drying, when these plants are cut with hay. (Nat. from Eu.)

* * *Achenia beset with rough points or small prickles: annuals.*

16. **R. muricàtus**, L. Nearly glabrous; lower leaves roundish or reniform, 3-lobed, coarsely crenate; the upper 3-cleft, wedge-form at the base; *petals longer than the calyx; carpels flat, spiny-tuberculate* on the sides, strongly beaked, surrounded with a wide and sharp smooth margin. — Eastern Virginia and southward. (Nat. from Eu.)

17. **R. parviflòrus**, L. Hairy, slender, and diffuse; lower leaves roundish-cordate, 3-cleft, coarsely toothed or cut; the upper 3 – 5-parted; *petals not longer than the calyx; carpels minutely hispid and rough,* beaked, narrowly margined. — Norfolk, Virginia, and southward. (Nat. from Eu.)

9. MYOSÙRUS, Dill. Mouse-tail.

Sepals 5, spurred at the base. Petals 5, small and narrow, raised on a slender claw, at the summit of which is a nectariferous hollow. Stamens 5 – 20. Achenia numerous, somewhat 3-sided, crowded on a very long and slender spike-like receptacle (whence the name, from *μῦς, a mouse,* and *οὐρά, a tail*), the seed suspended. — Little annuals, with tufted narrowly linear-spatulate root-leaves, and naked 1-flowered scapes. Flowers small, greenish.

1. **M. mínimus**, L. Carpels blunt. — Alluvial ground, Illinois and Kentucky, thence south and west. (Eu.)

10. ISOPÝRUM. L. (Enémion, Raf.)

Sepals 5, petal-like, deciduous. Petals 5, minute, wanting in the American species. Stamens 10 – 40. Pistils 3 – 6 or more, pointed with the styles. Pods ovate or oblong, 2 – several-seeded. — Slender smooth herbs, with 2 – 3-ternately compound leaves; the leaflets 2 – 3-lobed. Flowers axillary and terminal, white. (Name from ἴσος, *equal*, and πυρός, *wheat*; of no obvious application.)

1. **I. biternàtum,** Torr. & Gray. Petals none; pistils 3 – 6 (commonly 4), divaricate in fruit, 2 – 3-seeded; seeds even. ♃ — Moist shady places, Ohio, Kentucky, and westward. May. — Fibres of the root thickened here and there into little tubers. Aspect and size of the plant much like Thalictrum anemonoides.

11. CÁLTHA, L. Marsh Marigold.

Sepals 6 – 9, petal-like. Petals none. Pistils 5 – 10, with scarcely any styles. Pods (follicles) compressed, spreading, many-seeded. Glabrous perennials, with round and heart-shaped, or kidney-form, large, undivided leaves. (Name from κάλαθος, *a goblet*, in allusion to the golden flower-cup or calyx.)

1. **C. palústris,** L. (Marsh Marigold.) Stem hollow, furrowed; leaves round or kidney-shaped, either crenate or nearly entire; sepals about 6, broadly oval (bright yellow). — Swamps and wet meadows, common northward. April, May. — This well-known plant is used as a pot-herb in spring, when coming into flower, under the name of Cowslips; but the Cowslip is a totally different plant, namely, a species of Primrose. The Caltha should bear with us, as in England, the popular name of *Marsh Marigold.* (Eu.)

12. TRÓLLIUS, L. Globe-flower.

Sepals 5 – 15, petal-like. Petals numerous, small, 1-lipped, the concavity near the base. Stamens and pistils numerous. Pods 9 or more, sessile, many-seeded. — Smooth perennials with palmately parted and cut leaves, like Ranunculus, and large solitary terminal flowers. (Name thought to be derived from the old German word *troll*, a globe, or something round.)

1. **T. láxus,** Salisb. (Spreading Globe-flower.) Sepals 5 – 6, spreading; petals 15 – 25, inconspicuous, much shorter than the stamens. — Deep swamps, New Hampshire to Delaware and Michigan. May. — Flowers twice the size of the common Buttercup; the sepals spreading, so that the name is not appropriate, as it is to the *European Globe-flower* of the gardens, nor is the blossom showy, being pale greenish-yellow.

13. CÓPTIS, Salisb. Goldthread.

Sepals 5 – 7, petal-like, deciduous. Petals 5 – 7, small, club-shaped, hollow at the apex. Stamens 15 – 25. Pistils 3 – 7, on slender stalks. Pods divergent, membranaceous, pointed with the style, 4 – 8-seeded. — Low smooth perennials, with ternately divided root-leaves, and small white flowers on scapes. (Name from κόπτω, *to cut*, alluding to the divided leaves.)

1. **C. trifòlia,** Salisb. (THREE-LEAVED GOLDTHREAD.) Leaflets 3, obovate-wedge-form, sharply toothed, obscurely 3-lobed; scape 1-flowered. — Bogs, abundant northward; extending south to Maryland along the mountains. May. — Root of long, bright yellow, bitter fibres. Leaves evergreen, shining. Scape naked, slender, 3′ – 5′ high. (Eu.)

14. HELLÉBORUS, L. HELLEBORE

Sepals 5, petal-like or greenish, persistent. Petals 8 – 10, very small, tubular, 2-lipped. Pistils 3 – 10, sessile, forming coriaceous many-seeded pods. — Perennial herbs of the Old World, with ample palmate or pedate leaves, and large, solitary, nodding, early vernal flowers. (Name from *ἐλεῖν, to injure*, and *βορά*, *food*, from their well-known poisonous properties.)

1. **H.** VÍRIDIS, L. (GREEN HELLEBORE.) Root-leaves glabrous, pedate; calyx spreading, greenish. — Near Brooklyn and Jamaica, Long Island. (Adv. from Eu.)

15. AQUILÈGIA, Tourn. COLUMBINE.

Sepals 5, regular, colored like the petals. Petals 5, all alike, with a short spreading lip, produced backwards into large hollow spurs, much longer than the calyx. Pistils 5, with slender styles. Pods erect, many-seeded. — Perennials, with 2 – 3-ternately compound leaves, the leaflets lobed. Flowers large and showy, terminating the branches. (Name from *aquila*, an eagle, from some fancied resemblance of the spurs to talons.)

1. **A. Canadénsis,** L. (WILD COLUMBINE.) Spurs inflated, suddenly contracted towards the tip, nearly straight; stamens and styles longer than the ovate sepals. — Rocks, common. April – June. — Flowers 2′ long, scarlet, yellow inside, nodding, so that the spurs turn upward, but the stalk becomes upright in fruit. — More delicate and graceful than the

A. VULGÀRIS, L., the common GARDEN COLUMBINE, from the Old World, which is beginning to escape from cultivation in some places.

16. DELPHÍNIUM, Tourn. LARKSPUR.

Sepals 5, irregular, petal-like; the upper one prolonged into a spur at the base. Petals 4, irregular, the upper pair continued backwards into long spurs which are enclosed in the spur of the calyx; the lower pair with short claws: rarely all four are united into one. Pistils 1 – 5, forming many-seeded pods in fruit. — Leaves palmately divided or cut. Flowers in terminal racemes. (Name from *Delphin*, in allusion to the shape of the flower, which is sometimes not unlike the classical figures of the dolphin.)

1. **D. exaltàtum,** Ait. (TALL LARKSPUR.) Leaves deeply 3 – 5-cleft; the divisions narrow wedge-form, diverging, 3-cleft at the apex, acute; *racemes wand-like*, panicled, *many-flowered;* spur straight; *pods* 3, *erect.* ♃ — Rich soil, Penn. to Michigan, and southward. July. — Stem 2° – 5° high. Lower leaves 4′ – 5′ broad. Flowers purplish-blue, downy.

2 **D. tricórne,** Michx. (DWARF LARKSPUR.) Leaves deeply 5-parted, their divisions unequally 3–5-cleft; the lobes linear, acutish; *raceme few-flowered, loose;* spur straightish, ascending; *pods strongly diverging.* ♃ — W. Penn. to Illinois and southward. April, May. — Root a tuberous cluster. Stem simple, 6′–12′ high. Flowers bright blue, sometimes white.

3. **D. azùreum,** Michx. (AZURE LARKSPUR.) Leaves deeply 3–5-parted, the divisions 2–3 times cleft; the lobes all narrowly linear; *raceme strict;* spur ascending, usually curved upwards; *pods* 3–5, *erect.* ♃ — Wisconsin, Illinois, and southward. May, June. — Stem 1°–2° high, slender, often softly pubescent. Flowers sky-blue or whitish.

4.* **D.** CONSÓLIDA, L. (FIELD LARKSPUR.) Leaves dissected into narrow linear lobes; racemes rather few-flowered, loose; pedicels shorter than the bracts; *petals all combined into one body; pod one, glabrous.* ① — Penn. (Mercersburg, *Porter*) and Virginia, escaped from grain-fields: and sparingly along road-sides farther north. (Nat. from Eu.)

17. ACONÌTUM, Tourn. ACONITE. MONKSHOOD. WOLFSBANE.

Sepals 5, petal-like, very irregular; the upper one (helmet) hooded or helmet-shaped, larger than the others. Petals 2 (the 3 lower wanting entirely, or very minute rudiments among the stamens), consisting of small spur-shaped bodies raised on long claws and concealed under the helmet. Pistils 3–5. Pods several-seeded. Seed-coat usually wrinkled or scaly. — Perennials, with palmately cleft or dissected leaves, and showy flowers in racemes or panicles. (The ancient Greek and Latin name, said to be derived from *Acone,* in Bithynia.)

1. **A. uncinàtum,** L. (WILD MONKSHOOD.) Glabrous; *stem slender, erect,* but weak and disposed to climb; *leaves deeply* 3–5-*lobed,* petioled; the lobes ovate-lanceolate, coarsely toothed; *flowers blue; helmet erect, obtusely conical,* compressed, slightly pointed or beaked in front. — Rich shady soil along streams, S. W. New York, and southward along the mountains. June–Aug.

2. **A. reclinàtum,** Gray. (TRAILING WOLFSBANE.) Glabrous; stems trailing (3°–8° long); *leaves deeply* 3–7-*cleft,* petioled, the lower orbicular in outline; the divisions wedge-form, incised, often 2–3-lobed; *flowers white,* in very loose panicles; *helmet soon horizontal, elongated-conical,* with a straight beak in front. — Cheat Mountain, Virginia, and southward in the Alleghanies. Aug. — Lower leaves 5′–6′ wide. Flowers 9″ long, nearly glabrous.

18. ZANTHÒRHÌZA, Marshall. SHRUB YELLOW-ROOT.

Sepals 5, regular, spreading, deciduous. Petals 5, much smaller than the sepals, concave and obscurely 2-lobed, raised on a claw. Stamens 5 or 10. Pistils 5–15, bearing 2 or 3 pendulous ovules. Pods 1-seeded, oblong, the short style becoming dorsal in its growth. — A low shrubby plant; the bark and the long roots deep yellow and bitter. Flowers polygamous, dull purple, in compound drooping racemes, appearing, along with the 1–2-pinnate leaves, from large terminal buds in early spring. (Name compounded of ξανθός, *yellow,* and ῥίζα, *root.*)

1. **Z. apiifòlia,** L'Her. — Shady banks of streams, in the mountains of Pennsylvania and southward. Sherburne, New York, *Dr. Douglass*. Stems clustered, 1° – 2° high. Leaflets cleft and toothed. — The roots of this, and also of the next plant, were used as a yellow dye by the aborigines.

19. HYDRÁSTIS, L. ORANGE-ROOT. YELLOW PUCCOON.

Sepals 3, petal-like, falling away when the flower opens. Petals none. Pistils 12 or more in a head, 2-ovuled: stigma flat, 2-lipped. Ovaries becoming a head of crimson 1 – 2-seeded berries in fruit. — A low perennial herb, sending up in early spring, from a thick and knotted yellow rootstock, a single radical leaf, and a simple hairy stem, which is 2-leaved near the summit, and terminated by a single greenish-white flower. (Name perhaps from ὕδωρ, *water*, and δράω, *to act*, alluding to the active properties of the juice.)

1. **H. Canadénsis,** L. — Rich woods, New York to Wisconsin and southward. — Leaves rounded, heart-shaped at the base, 5 – 7-lobed, doubly serrate, veiny, when full grown in summer 4′ – 9′ wide.

20. ACTÆA, L. BANEBERRY. COHOSH.

Sepals 4 or 5, falling off when the flower expands. Petals 4 – 10, small, flat, spatulate, on slender claws. Stamens numerous, with slender white filaments. Pistil single: stigma sessile, depressed, 2-lobed. Fruit a many-seeded berry. Seeds smooth, flattened and packed horizontally in 2 rows. — Perennials, with ample 2 – 3-ternately compound leaves, the ovate leaflets sharply cleft and toothed, and a short and thick terminal raceme of white flowers. (Name from ἀκτῆ, the *Elder*, from some resemblance in the leaves.)

1. **A. spicàta,** L. (A. Americàna, *Pursh*. A. brachypétala, *DC.*) Called HERB CHRISTOPHER in Europe.

Var. **rùbra,** Michx. (RED BANEBERRY.) Petals about half the length of the stamens; *pedicels slender; berries cherry-red*, oval. (A. rubra, *Willd.*, *Bigel*, *&c*. Rich woods, New England to Penn. and Wisconsin, and northward. April, May. Plant 2° high. (Eu.)

Var. **álba,** Michx. (WHITE BANEBERRY or COHOSH.) Petals rather longer and narrower; *pedicels thickened* both in flower and fruit; *berries milk-white*, short-oval or globular. (A. alba, *Bigel*. A. pachýpoda, *Ell.*) — Rich woods, more common southward, extending to Virginia and Kentucky. May. — Plant 2° – 3° high. Pedicels in fruit often almost as thick as the main peduncle. Berries sometimes tinged with red or purple, very rarely deep red (*Dr. Knieskern*); while in some districts white berries occur abundantly on slender pedicels (*Mr. Oakes*, *Prof. Chadbourne*); also in Siberia. Nor does the length of the petals afford marked distinctions. So that all probably belong to one species.

21. CIMICÍFUGA, L. BUGBANE.

Sepals 4 or 5, falling off soon after the flower expands. Petals, or rather transformed stamens, 1 – 8, small, on claws, 2-horned at the apex. Stamens as in Actæa. Pistils 1–8, forming dry dehiscent pods in fruit.—Perennials, with 2–3-ternately-divided leaves, the leaflets cut-serrate, and white flowers in elongated wand-like racemes. (Name from *cimex*, a bug, and *fugo*, to drive away; the Siberian species being used as a bugbane.)

§ 1. MACRÒTYS, Raf.—*Pistil* 1, *sometimes* 2–3: *seeds smooth, flattened and packed horizontally in the pod in two rows, as in* Actæa: *stigma broad and flat.*

1. **C. racemòsa,** Ell. (BLACK SNAKEROOT.) Racemes very long; pods ovoid, sessile.—Rich woods, Maine and Vermont to Michigan, and southward. July.—Plant 3° – 8° high, from a thick knotted root-stock: the racemes in fruit becoming 1° – 2° long.

§ 2. CIMICIFUGA, L.—*Pistils* 3–8: *seeds flattened laterally, covered with chaffy scales, and occupying one row in the membranaceous pods: style awl-shaped: stigma minute.*

2. **C. Americàna,** Michx. (AMERICAN BUGBANE.) Racemes slender, panicled; ovaries mostly 5, glabrous; pods stalked, flattened, veiny, 6–8-seeded.—Mountains of S. Pennsylvania and southward throughout the Alleghanies. Aug.—Plant 2° – 4° high, more slender than No. 1.

ADÒNIS AUTUMNÀLIS, L., the PHEASANT'S EYE of Europe, has been found growing spontaneously in Western New York, and in Kentucky, but barely escaped from gardens.

NIGÉLLA DAMASCÈNA, L., the FENNEL-FLOWER, which offers a remarkable exception, in having the pistils partly united into a compound ovary, so as to form a several-celled pod, grows nearly spontaneously around gardens.

PÆÒNIA, the PÆONY, of which P. OFFICINALIS is familiar in gardens, forms a sixth tribe of this order, distinguished by a leafy persistent calyx, and a fleshy disk surrounding the base of the follicular pistils.

ORDER 2. MAGNOLIÀCEÆ. (MAGNOLIA FAMILY.)

Trees or shrubs, with the leaf-buds sheathed by membranous stipules, polypetalous, hypogynous, polyandrous, polygynous; the calyx and corolla colored alike, in three or more rows of three, and imbricated in the bud.—Sepals and petals deciduous. Stamens in several rows at the base of the receptacle: anthers adnate. Pistils many, mostly packed together and covering the prolonged receptacle, cohering with each other, and in fruit forming a sort of fleshy or dry cone. Seeds 1 or 2 in each carpel, anatropous: albumen fleshy: embryo minute.—Leaves alternate, not toothed, marked with minute transparent dots, feather-veined. Flowers single, large. Bark aromatic and bitter.—There are only two Northern genera, Magnolia and Liriodendron.

1. MAGNÒLIA, L. MAGNOLIA.

Sepals 3. Petals 6–9. Stamens with very short filaments, and long anthers opening inwards. Pistils aggregated on the long receptacle and coherent in a mass, together forming a fleshy and rather woody cone-like red fruit; each car pel at maturity opening on the back, from which the 1 or 2 berry-like seeds hang by an extensile thread composed of unrolled spiral vessels. Inner seed-coat bony.—Buds conical, the coverings formed of the successive pairs of stipules, each pair enveloping the leaf next above, which is folded lengthwise, and applied straight against the side of the next stipular sheath, and so on. (Named after *Magnol*, Professor of Botany at Montpellier in the 17th century.)

* *Leaves all scattered along the branches: buds silky.*

1. **M. glaùca,** L. (SMALL OR LAUREL MAGNOLIA. SWEET BAY.) *Leaves* oblong or oval, *obtuse, white beneath; petals white,* rounded-obovate; cone of fruit small, oblong.—Swamps, from near Cape Ann and New York southward, near the coast; in Pennsylvania as far west as Cumberland Co. June–Aug.—Shrub 4°–20° high, with thickish leaves, which farther south are ever green, and sometimes oblong-lanceolate. Flower very fragrant, 2′–3′ broad.

2. **M. acuminàta,** L. (CUCUMBER-TREE.) *Leaves oblong, pointed, green* and a little pubescent beneath; *petals glaucous-green* tinged with yellow, oblong; cone of fruit small, cylindrical.—Rich woods, W. New York, Penn., Ohio, and southward. May, June.—Tree 60–90 feet high. Leaves thin, 5′–10′ long. Flower 3′ broad. Fruit 2′–3′ long, when young slightly resembling a small cucumber, whence the common name.

3. **M. macrophỳlla,** Michx. (GREAT-LEAVED MAGNOLIA.) *Leaves obovate-oblong, cordate* at the narrowed base, pubescent and *white beneath; petals white,* with a purple spot inside at the base, ovate; cone of fruit ovoid.—Rockcastle and Kentucky Rivers, S. E. Kentucky. Occasionally planted farther north. May, June.—Tree 20°–40° high. Leaves 2½°–3° long. Flower 8′–10′ broad when outspread.

* * *Leaves crowded on the summit of the flowering branches in an umbrella-like circle: buds glabrous.*

4. **M. Umbrélla,** Lam. (UMBRELLA-TREE.) *Leaves obovate-lanceolate, pointed at both ends,* soon glabrous, petals obovate-oblong. (M. tripétala, *L.*)—Mountains of Penn. (and W. New York?) to Virginia and Kentucky along the Alleghanies. May.—A small tree. Leaves 1°–2° long. Flowers white, 7′–8′ broad. Fruit rose-color, 4′–5′ long, ovoid-oblong.

5. **M. Fràseri,** Walt. (EAR-LEAVED UMBRELLA-TREE.) *Leaves oblong-obovate or spatulate, auriculate at the base,* glabrous; petals obovate-spatulate, with narrow claws. (M. auriculàta, *Lam.*)—Virginia and Kentucky along the Alleghanies, and southward. April, May.—Tree 30°–50° high. Leaves 8′–12′ long. Flower (white) and fruit smaller than in the preceding.

M. CORDÀTA, Michx., the YELLOW CUCUMBER-TREE, of Georgia, and M. GRANDIFLÒRA, L., the GREAT LAUREL MAGNOLIA, of the Southern States (a noble tree, remarkable for its deliciously fragrant flowers, and thick evergreen leaves, which are shining and deep green above and rusty-colored beneath), are the only remaining North American species. The former is hardy as far north as Cambridge. One tree of the latter bears the winter and blossoms near Philadelphia. The Umbrella-tree attains only a small size in New England, where M. macrophylla is precarious.

2. LIRIODÉNDRON, L. TULIP-TREE.

Sepals 3, reflexed. Petals 6, in two rows, making a bell-shaped corolla. Anthers linear, opening outwards. Pistils flat and scale-form, long and narrow, imbricated and cohering together in an elongated cone, dry, separating from each other and from the long and slender axis in fruit, and falling away whole, like a samara or key, indehiscent, 1-2-seeded in the small cavity at the base. Buds flat, sheathed by the successive pairs of flat and broad stipules joined at their edges, the folded leaves bent down on the petiole so that their apex points to the base of the bud. (Name from λίριον, *lily* or *tulip*, and δένδρον, *tree*.)

1. **L. Tulipifera**, L.—Rich soil, S. New England to Michigan, Illinois, and southward. May, June.—A most beautiful tree, sometimes 140° high and 8°-9° in diameter in the Western States, where it is called wrongly POPLAR. Leaves very smooth, with 2 lateral lobes near the base, and 2 at the apex, which appears as if cut off abruptly by a broad shallow notch. Corolla 2′ broad, greenish-yellow marked with orange.

ORDER 3. ANONÀCEÆ. (CUSTARD-APPLE FAMILY.)

Trees or shrubs, with naked buds and no stipules, a calyx of 3 *sepals, and a corolla of* 6 *petals in two rows, valvate in the bud, hypogynous, polyandrous.*—Petals thickish. Anthers adnate, opening outwards: filaments very short. Pistils several or many, separate or cohering in a mass, fleshy or pulpy in fruit. Seeds anatropous, large, with a crustaceous seed-coat, and a minute embryo at the base of the *ruminated* albumen.—Leaves alternate, entire, feather-veined. Flowers axillary, solitary. Bark, &c. acrid-aromatic or fetid.—A tropical family, except one genus in the United States, viz.:

1. ASÍMINA, Adans. NORTH AMERICAN PAPAW.

Petals 6, increasing after the bud opens; the outer set larger than the inner. Stamens numerous in a globular mass. Pistils few, ripening 1-3 large and oblong pulpy several-seeded fruits. Seeds horizontal, flat, enclosed in a fleshy aril.—Shrubs or small trees, with unpleasant odor when bruised; the lurid flowers axillary and solitary. (Name from *Asiminier*, of the French colonists.)

1. **A. triloba**, Dunal. (COMMON PAPAW.) Leaves thin, obovate-lanceolate, pointed; petals dull-purple, veiny, round-ovate, the outer ones 3-4 times as long as the calyx. (Uvaria, *A. DC., Torr. & Gray.*)—Banks of streams in rich soil, W. New York and Penn. to Ohio and southward. April, May.—Tree 10°-20° high; the young shoots and expanding leaves clothed with a rusty down, soon glabrous. Flowers appearing with the leaves, 1½′ wide. Fruits 2′-3′ long, yellowish, sweet and edible in autumn.

A. PARVIFLÒRA, a smaller-flowered and small-fruited low species, probably does not grow so far north as Virginia.

ORDER 4. MENISPERMÀCEÆ. (MOONSEED FAMILY.)

Woody climbers, with palmate or peltate alternate leaves, no stipules; the sepals and petals similar, in three or more rows, imbricated in the bud; hypogynous, diœcious, 3–6-gynous; fruit a 1-seeded drupe, with a large or long curved embryo in scanty albumen. — Flowers small. Stamens several. Ovaries nearly straight, with the stigma at the apex, but often incurved in fruiting, so that the seed and embryo are bent into a crescent or ring. Properties bitter-tonic and narcotic. — Chiefly a tropical family: there are only three species, belonging to as many genera, in the United States.

Synopsis.

1. **COCCULUS. Stamens, petals, and sepals each 6. Anthers 4-celled.**
2. **MENISPERMUM. Stamens 12–24, slender. Petals 6–8. Sepals 4–8. Anthers 4-celled.**
3. **CALYCOCARPUM. Stamens in the sterile flowers 12, short; in the fertile flowers 6, abortive. Petals none. Anthers 2-celled.**

1. CÓCCULUS, DC. COCCULUS.

Sepals, petals, and stamens 6, the two latter short. Anthers 4-celled. **Pistils 3–6 in the fertile flowers: style pointed. Drupe and seed as in Moonseed. Cotyledons** narrowly linear and flat. — Flowers in axillary racemes or panicles. (An old name, from *coccum*, a berry.)

1. **C. Carolìnus**, DC. Minutely pubescent; leaves downy beneath, ovate or cordate, entire or sinuate-lobed, variable in shape; flowers greenish; the petals in the sterile ones auriculate-inflexed below around the filaments; drupe red (as large as a small pea). — River-banks, S. Illinois, Virginia, and southward. July.

2. MENISPÉRMUM, L. MOONSEED.

Sepals 4–8. Petals 6–8, short. Stamens 12–20 in the sterile flowers, as long as the sepals: anthers 4-celled. Pistils 2–4 in the fertile flowers, raised on a short common receptacle: stigma broad and flat. Drupe globular, the mark of the stigma near the base, the ovary in its growth after flowering being strongly incurved, so that the (wrinkled and grooved) laterally flattened stone (putamen) takes the form of a large crescent or a ring. The slender embryo therefore is horseshoe-shaped: cotyledons filiform. — Flowers white, in axillary panicles. (Name from μήνη, *moon*, and σπέρμα, *seed*.)

1. **M. Canadénse**, L. (CANADIAN MOONSEED.) Leaves peltate near the edge, 3–7-angled or lobed. — Banks of streams; common. June, July. Drupes black with a bloom, ripe in September, looking like frost grapes.

3. CALYCOCÁRPUM, Nutt. CUPSEED.

Sepals 6. Petals none. Stamens 12 in the sterile flowers, short: anthers 2-celled. Pistils 3, spindle-shaped, tipped with a radiate many-cleft stigma. Drupe not incurved; but the thin crustaceous putamen hollowed out like a cup on one side. Embryo foliaceous, heart-shaped. — Flowers greenish-white, in long racemose panicles. (Name composed of *κάλυξ*, *a cup*, and *καρπός*, fruit, from the shape of the shell.)

1. **C. Lyòni,** Nutt. (Menispermum Lyoni, *Pursh.*) — Rich soil, S. Kentucky. May. — Stems climbing to the tops of trees. Leaves large, thin, deeply 3 - 5-lobed, cordate at the base; the lobes acuminate. Drupe an inch long, globular, greenish; the shell crested-toothed on the edge of the cavity.

ORDER 5. BERBERIDÀCEÆ. (BARBERRY FAMILY.)

Shrubs or herbs, with the sepals and petals both imbricated in the bud in 2 or more rows of 2 – 4 *each; the hypogynous stamens as many as the petals and opposite them: anthers opening by* 2 *valves or lids hinged at the top.* (Podophyllum is an exception, and Jeffersonia as respects the sepals in one row.) *Pistil single.* Filaments short. Style short or none. Fruit a berry or a pod. Seeds few or several, anatropous, with albumen. Leaves alternate.

Synopsis.

TRIBE I. BERBERIDEÆ. Shrubs. Embryo large: cotyledons flat. (Berries acid and innocent. Bark astringent; the wood yellow.)

1. BERBERIS. Petals 6, each 2-glandular at the base.

TRIBE II. NANDINEÆ. Herbs. Embryo short or minute. (Roots and foliage sometimes drastic or poisonous.)

* Anthers opening by uplifted valves.

2. CAULOPHYLLUM. Petals 6, thick and gland-like, short. Ovules 2, soon naked
3. DIPHYLLEIA. Petals 6, flat, much longer than the calyx. Berry 2 - 4-seeded.
4. JEFFERSONIA. Petals 8. Pod many-seeded, opening on one side by a lid.

* * Anthers not opening by uplifted valves.

5. PODOPHYLLUM. Petals 6 - 9. Stamens 6 - 18! Fruit pulpy, many-seeded.

1. BÉRBERIS, L. BARBERRY.

Sepals 6, roundish, with 2 or 6 bractlets outside. Petals 6, obovate, concave, with 2 glandular spots inside above the short claw. Stamens 6. Stigma circular, depressed. Fruit a 1 - few-seeded berry. Seeds erect, with a crustaceous integument. — Shrubs, with yellow wood and inner bark, yellow flowers in drooping racemes, and sour berries and leaves. Stamens irritable. (Derived from *Berbêrys*, the Arabic name of the fruit.)

1. **B.** VULGÀRIS, L. (COMMON BARBERRY.) Leaves scattered on the fresh shoots of the season, mostly small and with sharp-lobed margins, or reduced to sharp triple or branched spines; from which the next season proceed rosettes or fascicles of obovate-oblong closely bristly-toothed leaves, and drooping *many-flowered racemes;* petals entire; *berries oblong,* scarlet. — Thickets and waste grounds, in E. New England, where it has become thoroughly wild: elsewhere rarely spontaneous. May, June. (Nat. from Eu.)

2. **B. Canadénsis,** Pursh. (AMERICAN BARBERRY.) Leaves repandly-toothed, the teeth less bristly-pointed; *racemes few-flowered;* petals

notched at the apex; *berries oval* (otherwise as in No. 1, of which Dr. Hooker deems it a variety, perhaps with reason). — Alleghanies of Virginia and southward: not in Canada. June. — Shrub 1° - 3° high.

B. (MAHÒNIA) AQUIFÒLIUM, Pursh, of Western N. America, — belonging to a section of the genus with mostly evergreen pinnate leaves and blue berries, — is not rare in cultivation, as an ornamental shrub.

2. CAULOPHÝLLUM, Michx. BLUE COHOSH.

Sepals 6, with 3 small bractlets at the base, ovate-oblong. Petals 6 thick and gland-like somewhat kidney-shaped or hooded bodies, with short claws, much smaller than the sepals, one at the base of each of them. Stamens 6: anthers oblong. Pistil gibbous: style short: stigma minute and unilateral: ovary bursting soon after flowering by the pressure of the 2 erect, enlarging seeds, and withering away; the spherical seeds naked on their thick seed-stalks, looking like drupes; the fleshy integument turning blue: albumen of the texture of horn. — A perennial glabrous herb, with matted knotty rootstocks, sending up in early spring a simple and naked stem, terminated by a small raceme or panicle of yellowish-green flowers, and a little below bearing a large triternately compound leaf without any common petiole (whence the name, from καυλός, *stem*, and φύλλον, *leaf;* the stem seeming to form a stalk for the great leaf). Leaflets obovate-wedge-form, 2 - 3-lobed.

1. **C. thalictroides,** Michx. (Also called PAPPOOSE-ROOT.) Leóntice thalictroides, *L.* — Deep rich woods. April, May. — Stems 1° - 2½° high. Flowers appearing while the leaf is yet small. A smaller biternate leaf often at the base of the panicle. Whole plant glaucous when young, also the seeds, which are of the size of large peas.

3. DIPHYLLÈIA, Michx. UMBRELLA-LEAF.

Sepals 6, fugacious. Petals 6, oval, flat, larger than the sepals. Stamens 6: anthers oblong. Ovary oblong: style hardly any: stigma depressed. Ovules 5 or 6, attached to one side of the cell below the middle. Berry few-seeded. Seeds oblong, with no aril. — A perennial glabrous herb, with thick horizontal rootstocks, sending up each year either a huge, centrally peltate and cut-lobed, rounded, umbrellá-like radical leaf on a stout stalk, or a flowering stem bearing two similar (but smaller and more 2-cleft) alternate leaves which are peltate near one margin, and terminated by a cyme of white flowers. (Name composed of δίς, *twice*, and φύλλον, *leaf.*)

1. **D. cymosa,** Michx. Wet or springy places, mountains of Virginia and southward. May. — Root-leaves 1° - 2° in diameter, 2-cleft, each division 5 - 7-lobed; lobes toothed. Berries blue.

4. JEFFERSÒNIA, Barton. TWIN-LEAF.

Sepals 4, fugacious. Petals 8, oblong, flat. Stamens 8: anthers oblong-linear, on slender filaments. Ovary ovoid, soon gibbous, pointed: stigma 2-lobed. Pod pear-shaped, opening half-way round horizontally, the upper part making a lid. Seeds many in several rows on the lateral placenta, with a fleshy lacerate aril on one side. — A perennial glabrous herb, with matted fibrous roots, long-petioled root-leaves, parted into 2 half-ovate leaflets, and simple naked 1-flowered scapes. (Named in honor of *Thomas Jefferson*.)

1. **J. diphýlla,** Pers. — Woods, W. New York to Wisconsin and southward. April, May. — Low. Flower white, 1′ broad: the parts rarely in threes or fives. — Called *Rheumatism-root* in some places.

5. PODOPHÝLLUM, L. May-Apple. Mandrake.

Flower-bud with 3 green bractlets, which early fall away. Sepals 6, fugacious. Petals 6 or 9, obovate. Stamens as many as the petals in the Himalayan species, twice as many in ours: anthers linear-oblong, not opening by uplifted valves. Ovary ovoid: stigma sessile, large, thick, and undulate. Fruit a large fleshy berry. Seeds covering the very large lateral placenta, in many rows, each seed enclosed in a pulpy aril, all forming a mass which fills the cavity of the fruit. — Perennial herbs, with creeping rootstocks and thick fibrous roots. Stems 2-leaved, 1-flowered. (Name from ποῦς, *a foot*, and φύλλον, *a leaf*, from a fancied resemblance of the 5-7-parted leaf to the foot of some web-footed animal.)

1. **P. peltàtum,** L. Stamens 12-18; leaves 5-9-parted; the lobes oblong, rather wedge-shaped, somewhat lobed and toothed at the apex. — Rich woods, common. May. — Flowerless stems terminated by a large, round, 7-9-lobed leaf, peltate in the middle, like an umbrella. Flowering stems bearing 2 one-sided leaves, with the stalk fixed near the inner edge; the nodding white flower from the fork, nearly 2′ broad. Fruit ovoid, 1′-2′ long, ripe in July, slightly acid, mawkish, eaten by pigs and boys. Leaves and roots drastic and poisonous!

Order 6. NELUMBIÀCEÆ. (Nelumbo Family.)

Huge aquatics, like Water-Lilies, *but the pistils distinct, forming acorn-shaped nuts, and separately imbedded in cavities of the enlarged top-shaped receptacle. Seeds solitary, filled with the large and highly developed embryo: albumen none.* — Sepals and petals colored alike, in several rows, hypogynous, as well as the numerous stamens, and *deciduous*. Leaves orbicular, centrally peltate and cup-shaped. — Embraces only the singular genus

1. NELÚMBIUM, Juss. Nelumbo. Sacred Bean.

Character same as of the order. (Name Latinized from *Nelumbo*, the Ceylonese name of the East Indian species.)

1. **N. lùteum,** Willd. (Yellow Nelumbo, or Water Chìnquepin.) Corolla pale yellow: anthers tipped with a slender hooked appendage. — Waters of the Western and Southern States; rare in the Middle States: introduced into the Delaware below Philadelphia. Big Sodus Bay, L. Ontario, and in the Connecticut near Lyme; perhaps introduced by the aborigines. June, July.

—Leaves 1°–2° broad. Flower 5′–8′ in diameter. Tubers farinaceous. Seeds also eatable. Embryo like that of Nymphæa on a large scale. Cotyledons thick and fleshy, enclosing a plumule of 1 or 2 well-formed young leaves, enclosed in a delicate stipule-like sheath.

ORDER 7. CABOMBÀCEÆ. (WATER-SHIELD FAMILY.)

Aquatics, like Water-Lilies; *but the hypogynous sepals, petals, stamens (in threes, persistent), and pistils much fewer (definite) in number, all distinct and separate.* Seeds very few.—Really no more than a simple state of Nymphæaceæ: embraces Cabomba, of the Southern States, and the following genus.

1. BRASÈNIA, Schreber. WATER-SHIELD.

Sepals 3 or 4. Petals 3–4, linear, sessile. Stamens 12–18: filaments filiform: anthers innate. Pistils 4–18, forming little club-shaped indehiscent pods. Seeds 1–2, pendulous on the dorsal suture! Embryo enclosed in a peculiar bag, at the end of the albumen next the hilum.—Rootstock creeping. Leaves alternate, long-petioled, centrally peltate, oval, floating on the water. Flowers axillary, small, dull-purple. (Name of uncertain origin.)

1. **B. peltàta,** Pursh. (Hydropéltis purpùrea, *Michx.*)—Ponds and slow streams. June–Aug.—Stalks coated with clear jelly. Leaves entire, 2′–3′ across. (Also a native of Australia and Eastern India!)

ORDER 8. NYMPHÆÀCEÆ. (WATER-LILY FAMILY.)

Aquatic herbs, with round or peltate floating leaves, and solitary showy flowers from a prostrate rootstock; the partly colored sepals and numerous petals and stamens imbricated in several rows; the numerous pistils combined into a many-celled compound ovary. Embryo small, enclosed in a little bag at the end of the albumen, next the hilum, with a distinct plumule, enclosed by the 2 fleshy cotyledons.—Sepals and petals persistent, hypogynous or perigynous; the latter passing into stamens: anthers adnate, opening inwards. Fruit a pod-like berry, ripening under water, crowned with the radiate stigmas, 14–30-celled; the many anatropous seeds attached to the sides and back of the cells.—Rootstocks imitating the endogenous structure (astringent, with some milky juice, often farinaceous).

1. NYMPHÆA, Tourn. WATER-NYMPH. WATER-LILY.

Sepals 4, green outside. Petals numerous, in many rows, the inner narrower and gradually passing into stamens, imbricately inserted all over the surface of the ovary. Stamens inserted on the top of the receptacle, the outer with petal-like filaments. Fruit depressed-globular, covered with the bases of the decayed petals. Seeds enveloped by a sac-like aril.—Flowers white rose-color, or blue, very showy. (Dedicated by the Greeks to the Water-Nymphs.)

1. **N. odoràta,** Ait. (Sweet-scented Water-Lily.) Leaves orbicular, sometimes almost kidney-shaped, cordate-cleft at the base to the petiole, the margin entire; flower white, fragrant; petals obtuse; anthers blunt. — Varies occasionally with the flowers rose-color. — Ponds, common; the trunks imbedded in the mud at the bottom, often as large as a man's arm. June – Sept. — Flower closing in the afternoon.

2. NÙPHAR, Smith. Yellow Pond-Lily. Spatter-dock.

Sepals 5 or 6, partly colored, roundish. Petals numerous, small and glandular, inserted with the stamens into an enlargement of the receptacle under the ovary, shorter than the circular and sessile many-rayed peltate stigma. Fruit ovoid, naked. Aril none. — Flowers yellow. Leaves roundish, sagittate-cordate. (Name from *Neufar*, the Arabic name for the Pond-Lily.)

1. **N. àdvena,** Ait. Leaves floating, or oftener emersed and erect, on stout half-cylindrical petioles; *sepals mostly* 6, very unequal; petals narrowly oblong, very thick and fleshy, truncate, resembling the very numerous stamens and shorter than they; *anthers much longer than the filaments; stigma* 12 – 24-rayed; the margin *entire or repand; fruit strongly furrowed,* ovoid-oblong, truncate, its summit not contracted into a beak. — In still or stagnant water; common. May – Sept. — Leaves 8′ – 12′ long, thick, rounded or oblong-ovate in outline. Flower 2′ broad.

2. **N. Kalmiàna,** Pursh. Leaves floating, on slender or filiform petioles; *sepals* 5; petals spatulate, as long as the moderately numerous stamens; *anthers shorter than the filaments; stigma* 8 – 14-rayed, the margin *crenate; fruit not furrowed,* ovoid-globose, contracted under the stigma into a *narrow and angled beak.* (N. lutea, var. Kalmiana, *Torr. & Gray, and ed.* 1. N. intermedium, *Ledeb.?*) — Ponds, &c., New England, New York, and northward. July, Aug. — Leaves 1½′ – 4′ long, roundish, the veins beneath much fewer and more branched than in the last. Flower 1′ – 1¼ broad. (Eu.?)

N. lùtea, Smith, I have not seen anywhere in the United States.

Order 9. SARRACENIÀCEÆ. (Pitcher-Plants.)

Polyandrous and hypogynous bog-plants, with hollow pitcher-form or trumpet-shaped leaves, — comprising one plant in the mountains of Guiana, another (Darlingtonia, *Torr.*) in those of California, and the following genus in the Atlantic United States

1. SARRACÈNIA, Tourn. Side-saddle Flower.

Sepals 5, with 3 bractlets at the base, colored, persistent. Petals 5, oblong or obovate, incurved, deciduous. Stamens numerous, hypogynous. Ovary compound, 5-celled, globose, crowned with a short style, which is expanded at the summit into a very broad and petal-like 5-angled, 5-rayed, umbrella-shaped body; the 5 delicate rays terminating under the angles in as many little hooked stigmas. Capsule with a granular surface, 5-celled, with many-seeded placentæ in the axis, 5-valved. Seeds anatropous, with a small embryo at the base of fleshy albumen. — Perennials, yellowish-green and purplish; the hollow leaves all radical, with a wing on one side, and a rounded arching hood at the apex. Scape naked, 1-flowered: flower nodding. (Named by Tournefort in honor of *Dr. Sarrazin* of Quebec, who first sent our Northern species, and a botanical account of it, to Europe.)

1. **S. purpùrea,** L. (SIDE-SADDLE FLOWER. PITCHER-PLANT. HUNTSMAN'S CUP.) *Leaves pitcher-shaped,* ascending, curved, broadly winged, the hood erect, open, round heart-shaped; *flower deep purple;* the fiddle-shaped petals arched over the (greenish-yellow) style. — Varies rarely with greenish-yellow flowers, and without purple veins in the foliage. (S. heterophýlla, *Eaton.*) — Peat-bogs; common from N. England to Wisconsin, and southward east of the Alleghanies. June. — The curious leaves are usually half filled with water and drowned insects: the inner face of the hood is clothed with stiff bristles pointing downward. Flower globose, nodding on a scape a foot high: it is difficult to fancy any resemblance between its shape and a side-saddle, but it is not very unlike a pillion.

2. **S. flàva,** L. (TRUMPETS.) *Leaves long* (1°–3°) *and trumpet-shaped,* erect, with an open mouth, the erect hood rounded, narrow at the base; wing almost none; *flower yellow,* the petals becoming long and drooping. — Bogs, Virginia and southward. April.

ORDER 10. PAPAVERÀCEÆ. (POPPY FAMILY.)

Herbs with milky or colored juice, regular flowers with the parts in twos or fours, fugacious sepals, polyandrous, hypogynous, the ovary 1*-celled with* 2 *or more parietal placentæ.* — Sepals 2, sometimes 3, falling when the flower expands. Petals 4–12, spreading, imbricated in the bud, early deciduous. Stamens 16–many, distinct. Fruit a dry 1-celled pod (in the Poppy imperfectly many-celled, in Glaucium 2-celled). Seeds numerous, anatropous, often crested, with a minute embryo at the base of fleshy and oily albumen. — Leaves alternate, without stipules. Peduncles mostly 1-flowered. Juice narcotic or acrid.

Synopsis.

* Petals more or less crumpled or corrugate in the bud.

+ Pod partly many-celled by the projecting placentæ, not valved.

1. PAPAVER. Stigmas united in a radiate crown: style none.

+ + Pod strictly 1-celled, 2–6-valved; the valves separating by their edges from the thread-like placentæ, which remain as a framework.

2. ARGEMONE. Stigmas (sessile) and placentæ 4–6. Pod and leaves prickly.
3. STYLOPHORUM. Stigmas and placentæ 3–4. Style distinct, columnar. Pod bristly.
4. CHELIDONIUM. Stigmas and placentæ 2. Pod linear, smooth. Petals 4.

+ + + Pod 2-celled by a spongy partition between the placentæ, 2-valved.

5. GLAUCIUM. Stigma 2-lobed. Pod linear. Petals 4.

* * Petals not crumpled in the bud.

6. SANGUINARIA. Petals 8–12. Pod oblong, turgid, 1-celled, 2-valved.

1. PAPÀVER, L. Poppy.

Sepals mostly 2. Petals mostly 4. Stigmas united in a flat 4-20-rayed crown, resting on the summit of the ovary and capsule; the latter short and turgid, with 4-20 many-seeded placentæ projecting like imperfect partitions, opening by as many pores or chinks under the edge of the stigma. — Herbs with a white juice; the flower-buds nodding. (Derivation obscure.) — Two species of the Old World are sparingly adventive; viz.

1. **P.** somníferum, L. (Common Poppy.) ① *Smooth*, glaucous; leaves clasping, wavy, incised and toothed; *pod globose;* corolla mostly white or purple. — Near dwellings in some places. (Adv. from Eu.)

2. **P.** dùbium, L. (Smooth-fruited Corn-Poppy.) ① Pinnatifid leaves and the long stalks *bristly; pods club-shaped, smooth;* corolla light scarlet. — Cult. grounds, Westchester, Penn. and southward: rare. (Adv. from Eu.)

2. ARGEMÒNE, L. Prickly Poppy.

Sepals 2 or 3. Petals 4-6. Style almost none: stigmas 3-6, radiate. Pod oblong, prickly, opening by 3-6 valves at the top. Seeds crested. — Herbs, with prickly bristles and yellow juice. Leaves sessile, sinuate-lobed, and with prickly teeth, blotched with white. Flower-buds erect, short-peduncled. (Name from ἀργέμα, a disease of the eye, for which the juice was a supposed remedy.)

1. A. Mexicàna, L. (Mexican Prickly Poppy.) ① ② Flowers solitary (pale yellow or white); calyx prickly. — Waste places; not common July-Oct. (Adv. from trop. Amer.)

3. STYLÓPHORUM, Nutt. Celandine Poppy.

Sepals 2, hairy. Petals 4. Style distinct, columnar: stigma 3-4-lobed. Pod ovoid, bristly, 3-4-valved to the base. Seeds conspicuously crested. — Perennial herb, with pinnatifid or pinnately divided leaves like Celandine, the uppermost in pairs, subtending one or more slender 1-flowered peduncles; the buds and pods nodding. Juice yellow. Corolla yellow. (Name from στῦλος, *a style*, and φέρω, *to bear;* indicating one of its characters.)

1. **S. diphýllum,** Nutt. (Meconópsis diphylla, *DC.*) — Woods, W. Penn. to Wisconsin and Kentucky. May. — Divisions of the leaves 5-7, sinuate-lobed. Flower 2′ broad.

4. CHELIDÒNIUM, L. Celandine.

Sepals 2. Petals 4. Stamens 16-24. Style nearly none: stigma 2-lobed. Pod linear, slender, smooth, 2-valved, the valves opening from the bottom upwards. Seeds crested. — Perennial herbs, with brittle stems, saffron-colored acrid juice, pinnately divided or 2-pinnatifid and toothed or cut leaves, and small yellow flowers. (Name from χελιδών, the *Swallow*, because, according to Dioscorides, it begins to flower at the time the swallows appear.)

1. **C.** màjus, L. (Celandine.) Flowers several, in umbel-like clusters. — Waste grounds near dwellings. May-Aug. (Adv. from Eu.)

5. GLAÚCIUM, Tourn. HORN-POPPY.

Sepals 2. Petals 2. Stamens indefinite. Style none: stigma 2-lobed or 2-horned. Pod very long and linear, completely 2-celled by a spongy false partition, in which the crestless seeds are partly immersed. — Annuals or biennials, with saffron-colored juice, clasping leaves, and solitary yellow flowers. (The Greek name, γλαύκιον, from the glaucous foliage.)

1. **G.** LÚTEUM, Scop. Glaucous; lower leaves pinnatifid; upper ones sinuate-lobed and toothed, cordate-clasping; pods rough (6′–10′ long). — Waste places, Maryland and Virginia; not common. (Adv. from Eu.)

6. SANGUINÀRIA, Dill. BLOOD-ROOT.

Sepals 2. Petals 8–12, spatulate-oblong, the inner narrower. Stamens about 24. Style short: stigma 2-grooved. Pod oblong, turgid, 1-celled, 2-valved. Seeds with a large crest. — A low perennial, with thick prostrate rootstocks, surcharged with red-orange acrid juice, sending up in earliest spring a rounded palmate-lobed leaf, and a 1-flowered naked scape. Flower white, handsome. (Name from the color of the juice.)

1. **S. Canadénsis**, L. — Open rich woods; common. April, May.

ESCHSCHÓLTZIA CALIFÓRNICA, and E. DOUGLÁSII, now common ornamental annuals in the gardens, are curious Papaveraceous plants from California and Oregon. Their juice is colorless, but with the odor of muriatic acid.

ORDER 11. FUMARIÀCEÆ. (FUMITORY FAMILY.)

Delicate smooth herbs, with watery juice, compound dissected leaves, irregular flowers, with 4 somewhat united petals, 6 diadelphous stamens, and pods and seeds like those of the Poppy Family. — Sepals 2, small and scale-like. Corolla flattened, closed; the 4 petals in two pairs; the outer with spreading tips, and one or both of them spurred or saccate at the base; the inner pair narrower, and with their callous crested tips united over the stigma. Stamens in two sets of 3 each, placed opposite the larger petals, hypogynous; their filaments often united; the middle anther of each set 2-celled, the lateral ones 1-celled. Stigma flattened at right angles with the ovary. Pod 1-celled, either 1-seeded and indehiscent, or several-seeded with 2 parietal placentæ. — Leaves usually alternate, without stipules. (Slightly bitter, innocent plants.)

Synopsis.

* Pod slender: the 2 valves separating from the persistent filiform placentæ.

1. ADLUMIA. Corolla heart-shaped, persistent; petals united. Seeds crestless.
2. DICENTRA. Corolla heart-shaped or 2-spurred at the base. Seeds crested.
3. CORYDALIS. Corolla 1-spurred at the base. Seeds crested.

* * Pod fleshy, indehiscent, globular, 1-seeded.

4. FUMARIA. Corolla 1-spurred at the base. Seed crestless.

1. ADLÙMIA, Raf. CLIMBING FUMITORY.

Petals all permanently united in an ovate corolla, 2-saccate at the base, becoming dry and persistent, enclosing the small few-seeded pod. Seeds not crested. Stigma 2-crested. Stamens diadelphous. — A climbing biennial vine, with thrice-pinnate leaves, cut-lobed delicate leaflets, and ample panicles of drooping whitish flowers. (Dedicated by Rafinesque to *Major Adlum*.)

1. **A. cirrhòsa,** Raf. (Corydalis fungosa, *Vent.*) — Wet woods; common westward. July – Oct. — A handsome vine, with delicate foliage and pale flesh-colored blossoms, climbing by the tendril-like young leafstalks over high bushes; cultivated for festoons and bowers in shaded places.

2. DICÉNTRA, Bork. DUTCHMAN'S BREECHES.

Petals slightly united into a heart-shaped or 2-spurred corolla, either deciduous or withering. Stigma 2-crested and sometimes 2-horned. Filaments slightly united in two sets. Pod 10 – 20-seeded. Seeds crested. — Low, mostly stemless perennials, with ternately compound and dissected leaves, and racemose nodding flowers. Pedicels 2-bracted. (Name from δίς, *twice*, and κέντρον, *a spur*.)

1. **D. Cucullària,** DC. (DUTCHMAN'S BREECHES.) *Granulate-bulbous;* lobes of the leaves linear; *raceme simple,* few-flowered; *corolla with 2 divergent spurs* longer than the pedicel; *crest of the inner petals minute.* — Rich woods, especially westward. April, May. — A very delicate plant, sending up in early spring, from the cluster of little grain-like tubers crowded together in the form of a scaly bulb, the finely cut long-stalked leaves and slender scape, the latter bearing 4 – 10 pretty, but odd, white flowers tipped with cream-color.

2. **D. Canadénsis,** DC. (SQUIRREL-CORN.) Subterranean shoots *tuberiferous;* leaves and raceme as in No. 1; *corolla* merely *heart-shaped,* the spurs very short and rounded; *crest of the inner petals conspicuous, projecting.* — Rich woods, Maine to Wisconsin and Kentucky, especially northward. April, May. — Tubers scattered, round, flattened, as large as peas or grains of Indian Corn, yellow. Calyx minute. Flowers greenish-white tinged with red, with the fragrance of Hyacinths.

3. **D. eximia,** DC. Subterranean shoots *scaly;* divisions and lobes of the leaves broadly oblong; *raceme compound, clustered; corolla oblong,* 2-*saccate* at the base; crest of the inner petals projecting. — Rocks, W. New York, rare (*Thomas, Sartwell*), and Alleghanies of Virginia. May – Aug. — A larger plant than the others. Flowers reddish-purple.

3. CORÝDALIS, Vent. CORYDALIS.

Corolla 1-spurred at the base (on the upper side), deciduous. Style persistent. Pod many-seeded. Seeds crested. Flowers in racemes. Our species are biennial and leafy-stemmed. (The ancient Greek name for the Fumitory.)

1. **C. aùrea,** Willd. (GOLDEN CORYDALIS.) *Stems low, spreading; racemes* simple; spur incurved; *pods pendent;* seeds with a scalloped crest. —

Rocks by streams, Vermont to Wisconsin and Kentucky. April–July. — Glaucous: flowers golden-yellow and showy, or paler and less handsome. Pods 1′ long, uneven.

2. **C. glaùca,** Pursh. (Pale Corydalis.) *Stem upright;* racemes panicled; spur short and rounded; *pods erect,* slender, elongated; seeds with a small entire crest. — Rocky places; common. May–July. — Corolla whitish, shaded with yellow and reddish.

4. FUMÀRIA, L. Fumitory.

Corolla 1-spurred at the base. Style deciduous. Fruit indehiscent, small, globular, 1-seeded. Seeds crestless. — Branched annuals, with finely dissected compound leaves, and small flowers in dense racemes or spikes. (Name from *fumus,* smoke.)

1. **F. officinàlis,** L. (Common Fumitory.) Sepals ovate-lanceolate, acute, sharply toothed, narrower and shorter than the corolla (which is flesh-color tipped with crimson); fruit slightly notched. — Waste places, about dwellings. (Adv. from Eu.)

Order 12. CRUCÍFERÆ. (Mustard Family.)

Herbs with a pungent watery juice and cruciform tetradynamous flowers: fruit a silique or silicle. — Sepals 4, deciduous. Petals 4, hypogynous, regular, placed opposite each other in pairs, their spreading limbs forming a cross. Stamens 6, two of them inserted lower down and shorter. Pod 2-celled by a thin partition stretched between the 2 marginal placentæ, from which when ripe the valves separate, either much longer than broad (a *silique*), or short (a *silicle* or *pouch*), sometimes indehiscent and nut-like (*nucumentàceous*), or separating across into 1-seeded joints (*lomentaceous*). Seeds campylotropous, without albumen, filled by the large embryo, which is curved or folded in various ways: i. e. the *cotyledons accumbent,* viz. their margins on one side applied to the radicle, so that the cross-section of the seed appears thus o⊖; or else *incumbent,* viz. the back of one cotyledon applied to the radicle, thus o‖. In these cases the cotyledons are plane; but they may be folded upon themselves, as in Mustard, where they are conduplicate, thus o≫. In Leavenworthia alone the whole embryo is straight. — Leaves alternate, no stipules. Flowers in terminal racemes or corymbs: pedicels not bracted. — A large and very natural family, of pungent or acrid, but not poisonous plants. (Characters taken from the pods and seeds; the flowers being nearly alike in all.)

Synopsis.

I. SILIQUOSÆ. Pod long, a *silique,* opening by valves.

Tribe I. **ARABIDEÆ.** Pod elongated (except in Nasturtium). Seeds flattened. Cotyledons accumbent, plane.

* Pod terete, or slightly flattened; the valves nerveless.

1. NASTURTIUM. Pod linear, oblong, or even globular, turgid. Seeds irregularly in two rows in each cell, small.

2. IODANTHUS. Pod linear, elongated. Seeds in a single row in each cell.

* Pod flat; the valves nerveless. Seeds in one row in each cell.

3. LEAVENWORTHIA. Pod oblong. Seeds winged. Embryo straight! Leaves all radical.

4. DENTARIA. Pod lanceolate. Seeds wingless, on broad seed-stalks. Stem few-leaved.

5. CARDAMINE. Pod linear or linear-lanceolate. Seeds wingless, on slender seed-stalks. Stems leafy below.

* * * Pod flattened or 4-angled, linear; the valves one-nerved in the middle, or veiny.

6. ARABIS. Pods flat or flattish. Seeds in one row in each cell. Flowers white or purple.

7. TURRITIS. Pods and flowers as in Arabis, but the seeds occupying two rows in each cell.

8. BARBAREA. Pod somewhat 4-sided. Seeds in one row in each cell. Flowers yellow.

TRIBE II. **SISYMBRIEÆ.** Pod elongated. Seeds thickish. Cotyledons incumbent, narrow, plane.

9. ERYSIMUM. Pod sharply 4-angled, linear. Flowers yellow.

10. SISYMBRIUM. Pods terete, or obtusely 4–6-angled, or flattish. Flowers white or yellow.

TRIBE III. **BRASSICEÆ.** Pod elongated. Seeds globular. Cotyledons incumbent and conduplicate, folded round the radicle.

11. SINAPIS. Pod terete; the valves 3–5-nerved. Calyx spreading.

II. SILICULOSÆ. Pod short, a *silicle* or pouch, opening by valves.

TRIBE IV. **ALYSSINEÆ.** Pod oval or oblong, flattened parallel to the broad partition, if at all. Cotyledons accumbent, plane.

12. DRABA. Pod flat, many-seeded: valves 1–3-nerved.

13. VESICARIA. Pod globular, inflated, 4 – several-seeded: valves nerveless.

1. NASTURTIUM. Pod turgid, many-seeded: valves nerveless.

TRIBE V. **CAMELINEÆ.** Pod ovoid or oblong, flattened parallel to the broad partition. Cotyledons incumbent, plane.

14. CAMELINA. Pod obovoid, turgid: valves 1-nerved. Style slender.

TRIBE VI. **LEPIDINEÆ.** Pod short, the boat-shaped valves flattened contrary to the narrow partition. Cotyledons incumbent (accumbent in one instance), plane.

15. LEPIDIUM. Pod two-seeded.

16. CAPSELLA. Pod many-seeded, inversely heart-shaped-triangular.

TRIBE VII. **SUBULARIEÆ.** Pod oval, turgid, somewhat flattened contrary to the broad partition. Cotyledons long and narrow, transversely folded on themselves and incumbent.

17. SUBULARIA. Pod several-seeded: the valves convex-boat-shaped.

TRIBE VIII. **SENEBIEREÆ.** Pod compressed contrary to the very narrow partition; the cells separating from the partition at maturity as two closed one-seeded nutlets. Cotyledons as in Tribe 7.

18. SENEBIERA. Nutlets or closed cells roundish, reticulated.

III. LOMENTACEÆ. Pod articulated, i. e. separating across into two or more closed joints.

TRIBE IX. **CAKILINEÆ.** Cotyledons plane and accumbent, as in Tribe 1.

19. CAKILE. Pod short, 2-jointed: the joints 1-celled and 1-seeded.

TRIBE X. **RAPHANEÆ.** Cotyledons conduplicate and incumbent, as in Tribe 3.

20. RAPHANUS. Pod elongated several-seeded, transversely intercepted.

1. NASTÚRTIUM, R. Br. WATER-CRESS.

Pod a short silique or a silicle, varying from oblong-linear to globular, terete or nearly so, often curved upwards: valves nerveless. Seeds small, turgid, marginless, in 2 irregular rows in each cell. Cotyledons accumbent. — Aquatic or marsh plants, with yellow or white flowers, and pinnate or pinnatifid leaves, usually glabrous. (Name from *Nasus tortus*, a convulsed nose, alluding to the effect of its pungent qualities.)

§ 1. *Petals white, twice the length of the calyx: pods linear: leaves pinnate.*

1. **N. OFFICINÀLE**, R. Br. (WATER-CRESS.) Stems spreading and rooting; leaflets 3 – 11, roundish or oblong, nearly entire; pods (6″ – 8″ long) on slender widely spreading pedicels. ♃ — Brooks and ditches; rare: escaped from cultivation. (Nat. from Eu.)

§ 2. *Petals yellow or yellowish, seldom much exceeding the calyx: pods linear, oblong, ovoid, or globular: leaves mostly pinnatifid.*

* *Perennial from creeping or subterranean shoots: flowers rather large, bright yellow.*

2. **N. SYLVÉSTRE.** R. Br. (YELLOW CRESS.) Stems ascending; *leaves pinnately parted*, the divisions toothed or cut, lanceolate or linear; pods linear (4″ – 6″ long), on slender pedicels; *style very short*. — Wet meadows, near Philadelphia; and Newton, Massachusetts, *C. J. Sprague*. (Adv. from Eu.)

3. **N. sinuàtum,** Nutt. Stems low, diffuse; *leaves pinnately cleft*, the short lobes nearly entire, linear-oblong; pods linear-oblong (4″ – 6″ long), on slender pedicels; *style slender*. — Banks of the Mississippi and westward. June.

* * *Annual or biennial, rarely perennial? with simple fibrous roots: flowers small or minute, greenish or yellowish: leaves somewhat lyrate.*

4. **N. sessiliflòrum,** Nutt. Stems erect, rather simple; *leaves obtusely incised* or toothed, obovate or oblong; *flowers minute, nearly sessile;* pods elongated-oblong (5″ – 6″ long), thick; style very short. — With No. 3 and southward. April – June.

5. **N. obtùsum,** Nutt. Stems much branched, diffusely spreading; *leaves pinnately parted or divided*, the divisions roundish and obtusely toothed or repand; *flowers minute, short-pedicelled; pods longer than the pedicels*, varying from linear-oblong to short-oval; style short. — With No. 3 and 4.

6. **N. palústre,** DC. (MARSH CRESS.) Stem erect; *leaves pinnately cleft or parted*, or the upper laciniate; the lobes oblong, cut-toothed; *pedicels about as long as the small flowers and mostly longer than* the oblong, ellipsoid, or ovoid *pods;* style short. — Wet ditches and borders of streams, common. June – Sept. — Flowers only 1″ – 1½″ long. Stems 1° – 3° high. — The typical form with oblong pods is rare (W. New York, *Dr. Sartwell*). Short pods and hirsute stems and leaves are common. Var. HISPÌDUM (N. hispidum, *DC.*) is this, with ovoid or globular pods. (Eu.)

§ 3. *Petals white, much longer than the calyx: pods ovoid or globular: leaves undivided, or the lower ones pinnatifid.* (Armoracia.)

7. **N. lacústre,** Gray, Gen. Ill. 1, p. 132. (LAKE CRESS.) Aquatic; immersed leaves 1 – 3-pinnately dissected into numerous capillary divisions; emersed leaves oblong, entire, serrate, or pinnatifid; pedicels widely spreading;

pods ovoid, one-celled, a little longer than the style. ♃ (N. natans, *ed.* 1. N. natans, var. Americanum, *Gray.* Armoracia Americana, *Arn.*) — Lakes and rivers, N. New York to Illinois and Kentucky. July.

8. **N.** ARMORÀCIA, Fries. (HORSERADISH.) Root-leaves very large, oblong, crenate, rarely pinnatifid; those of the stem lanceolate; fruiting pedicels ascending; *pods globular* (seldom formed); *style very short.* ♃ (Cochleària Armoracia, *L.*) — Roots large and long; — a well-known condiment. Escaped from cultivation into moist ground. (Adv. from Eu.)

2. IODÁNTHUS, Torr. & Gray. FALSE ROCKET.

Pod linear, elongated, terete; the valves nerveless. Seeds in a single row in each cell, not margined. Cotyledons accumbent. Claws of the violet-purple petals longer than the calyx. — A smooth perennial, with ovate-oblong pointed and toothed leaves, the lowest sometimes lyrate-pinnatifid, and showy flowers in panicled racemes. (Name from ἰώδης, *violet-colored,* and ἄνθος, *flower.*)

1. **I. hesperidoìdes,** Torr. & Gray. (Hèsperis pinnatifida, *Michx.*) — Banks of rivers, west of the Alleghanies. May, June. — Stem 1°-3° high. Petals 5″ long, spatulate. Pods 1′ to nearly 2′ long, somewhat curved upwards.

3. LEAVENWÓRTHIA, Torr. LEAVENWORTHIA.

Pod linear or oblong, flat; the valves nerveless, but minutely reticulate-veined. Seeds in a single row in each cell, flat, surrounded by a wing. Embryo straight! or the short radicle only slightly bent in the direction which if continued would make the orbicular cotyledons accumbent. — Little biennials or hyemal annuals, glabrous and stemless, with lyrate root-leaves and short one-few-flowered scapes. (Named in honor of *Dr. M. C. Leavenworth,* the discoverer of one species.)

1. **L. Michaúxii,** Torr. *Scapes one-flowered; petals white or purplish,* yellowish towards the base. (Cardamine uniflora, *Michx.*) — On flat rocks, Southeastern Kentucky (also Tennessee and Alabama, whence *Prof. Hatch* sends it with purple flowers). March, April.

2. **L. aùrea,** Torr. *Scapes* 1-8-*flowered; petals yellow,* larger than in the other (perhaps not distinct). — With No. 1, and southwestward.

4. DENTÀRIA, L. TOOTHWORT. PEPPER-ROOT.

Pod lanceolate, flat, as in Cardamine, but broader. Seed-stalks broad and flat. — Perennials, with long, horizontal, fleshy, sometimes interrupted, toothed rootstocks of a pleasant pungent taste; the low simple stems bearing 2 or 3 petioled compound leaves about the middle, and terminated by a single raceme of large white or purple flowers. (Name from *dens,* a tooth.)

1. **D. diphylla,** L. *Rootstock long and continuous, toothed; stem-leaves* 2, *similar to the radical ones,* close together, of 3 rhombic-ovate coarsely toothed leaflets. — Rich woods, Maine to Kentucky. May. — Rootstocks 5′-10′ long, crisp, tasting like Water-Cress. Flowers white.

2. **D. máxima,** Nutt. *Rootstock interrupted, forming a string of toothed tubers; stem-leaves* (2–7) *mostly* 3 *and alternate; leaflets* 3, *ovate,* obtuse, coarsely toothed and incised, often 2–3-cleft. (D. laciniata, var. δ., *Torr. & Gr.*) — W. New York, and Penn., *Nuttall!* Watertown, New York, *Dr. Crawe!* May. — Stem 10′–2° (*Nutt.*) high: raceme elongated. Flowers larger than in No. 1, purple. Joints of the rootstock 1′–2′ long, ½′ thick, starchy. The leaves are intermediate between No. 1 and No. 3.

3. **D. laciniàta,** Muhl. *Rootstock necklace-form,* consisting of a chain of 3 or 4 *nearly toothless* oblong tubers; *stem-leaves* 3 *in a whorl,* 3*-parted; the leaflets linear or lanceolate,* obtuse, irregularly cut or cleft into narrow teeth, the lateral ones deeply 2-lobed. — Rich soil along streams, W. New England to Wisconsin and Kentucky. May. — A span high: raceme scarcely longer than the leaves. Flowers pale purple. Root-leaves much dissected.

4. **D. heterophýlla,** Nutt. *Rootstock necklace-form,* obscurely toothed; *stem-leaves* 2 *or* 3, small, *alternate,* 3*-parted, the leaflets lanceolate and nearly entire; root-leaves of* 3 *round-ovate* obtuse somewhat toothed and lobed *leaflets.* — Western Pennsylvania, Virginia, and Kentucky. May. — A span high, slender: stem-leaves 1′ long. Flowers few, purple.

5. CARDÁMINE, L. Bitter Cress.

Pod linear, flattened, usually opening elastically from the base; the valves nerveless and veinless, or nearly so. Seeds in a single row in each cell, wingless; their stalks slender. Cotyledons accumbent. — Flowers white or purple. (From Κάρδαμον, an ancient Greek name for Cress.) — Runs into Dentaria on the one hand, into Arabis on the other.

* *Root perennial: leaves simple or* 3*-foliolate.*

1. **C. rhomboidea,** DC. (Spring Cress.) *Stems upright, tuberiferous* at the base; *stems simple;* root-leaves round and rather heart-shaped; lower stem-leaves ovate or rhombic-oblong, somewhat petioled, the upper almost lanceolate, all somewhat angled or sparingly toothed; pods linear-lanceolate, pointed with a slender style tipped with a conspicuous stigma; *seeds round-oval.* — Wet meadows and springs; common. Flowers large, white. April–June.

Var. **purpùrea,** Torr. Lower (4′–6′ high) and slightly pubescent; leaves rounder; flowers rose-purple, appearing earlier. — Along streams in rich soil, W. New York to Wisconsin.

2. **C. rotundifòlia,** Michx. (American Water-Cress.) *Stems branching, weak or decumbent, with creeping runners; root fibrous;* leaves all much alike, roundish, somewhat angled, often heart-shaped at the base, petioled, the lowest frequently 3-lobed or of 3 leaflets; pods linear-awl-shaped, pointed with the style; stigma minute; *seeds oval-oblong.* (*Sill. Journal,* 42. p. 30.) — Cool, shaded springs, Penn., and southward along the mountains. May, June. — Leaves with just the taste of the English Water-Cress. Runners in summer 1°–3° long. Flowers white, smaller than in No. 1.

3. **C. bellidifòlia,** L. *Dwarf* (2′–3′ high), tufted; leaves ovate, entire, or sometimes 3-lobed (4″ long), on long petioles; pods upright, linear; *style*

nearly none. — Alpine summit of the White Mountains, New Hampshire. July. — Flowers 1 – 5, white. Pods 1′ long, turgid, the convex valves 1-nerved: so that the plant might as well be an Arabis! (Eu.)

* * *Root perennial: leaves pinnate: flowers showy.*

4. **C. praténsis,** L. (Cuckoo-flower.) Stem ascending; leaflets 7 – 13, those of the lower leaves rounded and stalked; of the upper ones oblong or linear, entire, or slightly angled-toothed; petals (white or rose-color) thrice the length of the calyx; style short but distinct. — Wet places and bogs, Vermont to Wisconsin northward; rare. May. (Eu.)

* * * *Root biennial or annual: leaves pinnate: flowers small.*

5. **C. hirsùta,** L. (Common Bitter Cress.) Mostly smooth in the United States, sometimes hairy; leaves pinnate with 5 – 13 leaflets, or lyrate-pinnatifid; leaflets of the lower leaves rounded, angled or toothed; of the upper oblong or linear, often entire; petals twice as long as the calyx (white); the narrow pods and the pedicels upright: style shorter than the width of the pod. (C. Pennsylvanica, *Muhl.*) — Moist places, everywhere: a small delicate variety, with narrow leaflets, growing on dry rocks, is C. Virginica, Michx. (not of *Hb. Linn.*) May – July. (Eu.)

6. ÁRABIS, L. Rock Cress.

Pod linear, flattened; the valves plane or convex, 1-nerved in the middle, or longitudinally veiny. Seeds in a single row in each cell, usually margined or winged. Cotyledons accumbent. — Flowers white or rose-color. (Name from the country, *Arabia.* See *Linn. Phil. Bot.*, § 235.)

* *Leaves all pinnately parted: root annual or biennial. (Aspect of Cardamine.)*

1. **A. Ludoviciàna,** Meyer. Nearly glabrous, diffusely branched from the base (5′ – 10′ high); divisions of the almost pinnate leaves numerous, oblong or linear, few-toothed or incised; flowers very small; pods erect-spreading, flat (9″ – 12″ long, 1″ wide), the valves longitudinally veiny (not elastic); seeds wing-margined. (Cardamine Ludoviciana, *Hook.* Sisymbrium, *Nutt.*) — Open fields, &c., Illinois, Kentucky, and southward. April.

* * *Stem-leaves, if not the root-leaves, undivided: annuals or doubtful perennials.*

+– *Seeds wingless or slightly margined.*

2. **A. lyràta,** L. Diffusely branched, low (4′ – 10′ high), glabrous except the *lyrate-pinnatifid radical leaves; stem-leaves spatulate or lanceolate, tapering to the base,* the upper entire; petals (white) twice the length of the calyx; *pods spreading,* long and slender, *pointed with a short style.* — Rocks. April – June. — Radicle sometimes oblique. — A variety? from Upper Michigan and northward, (Sisymbrium arabidoides, *Hook.*) has erect pods, and the cotyledons often wholly incumbent.

3. **A. dentàta,** Torr. & Gray. Roughish-pubescent, diffusely branched (1° – 2° high), *leaves oblong,* very obtuse, unequally and sharply toothed; those of the stem *half-clasping and eared* at the base, of the root broader and tapering into a short petiole; petals (whitish) scarcely exceeding the calyx, *pods spreading, straight, short-stalked; style scarcely any.* — New York and Illinois to Virgin

ia and Kentucky. May.—About 1° high, slender. Pods 1′ long, almost filiform; the valves obscurely nerved.

4. **A. pàtens,** Sulliv. Downy with spreading hairs, erect (1°–2° high); *stem-leaves oblong-ovate, acutish,* coarsely toothed or the uppermost entire, half-clasping by the heart-shaped base; petals (bright white) twice the length of the calyx; *pedicels slender, spreading; pods spreading and curving upwards, tipped with a distinct style.*—Rocky banks of the Scioto, Ohio, *Sullivant.* (Also Tennessee.) May.—Flowers thrice as large as in No. 5. Pods 1½′–2′ long.

5. **A. hirsùta,** Scop. Rough-hairy, sometimes smoothish, strictly erect (1°–2° high); stem-leaves oblong or lanceolate, entire or toothed, partly clasping by a somewhat arrow-shaped or heart-shaped base; petals (greenish-white) small, but longer than the calyx; *pedicels and pods strictly upright; style scarcely any.*—Rocks, common, especially northward. May, June.—Stem 1°–2° high, simple or branched from the base. Root-leaves spatulate-oblong, sessile or nearly so. Flowers small. (Eu.)

+ + *Seeds winged; their stalks adherent to the partition: petals narrow, whitish.*

6. **A. lævigàta,** DC. *Smooth* and glaucous, upright; *stem-leaves partly clasping* by the arrow-shaped base, lanceolate or linear, sparingly cut-toothed or entire; petals scarcely longer than the calyx; *pods long and narrow, recurved-spreading.*—Rocky places, Maine to Wisconsin and Kentucky. May.—Stem 1°–3° high. Pods 3′ long, on short merely spreading pedicels. (This is also A. heterophylla, *Nutt.*)

7. **A. Canadénsis,** L. (SICKLE-POD.) Stem upright, smooth above; *stem-leaves pubescent, pointed at both ends,* oblong-lanceolate, sessile, the lower toothed; petals twice the length of the calyx, oblong-linear; *pods drooping, flat, scythe-shaped.* (A. falcàta, *Michx.*)—Woods. June–Aug.—Stem 2°–3° high. Pods 3′ long and 2″ broad, veiny, hanging on rough-hairy pedicels, curved like a scymitar.

7. TURRÌTIS, Dill. TOWER MUSTARD.

Pod and flowers, &c., as in Arabis; but the seeds occupying 2 longitudinal rows in each cell.—Biennials or rarely annuals. Flowers white or rose-color (Name from *turris,* a tower.)

1. **T. glàbra,** L. *Stem-leaves oblong or ovate-lanceolate,* smooth and glaucous, entire, half-clasping by the arrow-shaped base; the yellowish white *petals little longer than the calyx;* flowers and the long and narrow (3′ long) straight *pods strictly erect.*—Rocks and fields; common northward. June. (Eu.)

2. **T. stricta,** Graham. Smooth (1°–2° high); *stem-leaves lanceolate or linear,* half-clasping by the arrow-shaped base, entire or nearly so; *petals twice the length of the calyx; pedicels erect in flower;* the linear elongated flat pods upright or spreading at maturity. Jefferson and Chenango Counties, New York. Lake Superior, and northward. May.—Root-leaves small. Petals white, tinged with purple. Ripe pods 2½′–4′ long, 1″ wide.

3. **T. brachycárpa,** Torr. & Gray. Smooth and glaucous; *stem-leaves linear-lanceolate,* acute, arrow-shaped; *pedicels of the flowers nodding,* of the short

and broadish pods spreading or ascending. — Fort Gratiot, &c., Michigan. — Root-leaves hairy. Pod 1′ long. Flowers pale purple.

8. BARBARÈA, R. Br. WINTER CRESS.

Pod linear, terete or somewhat 4-sided; the valves being keeled by a midnerve. Seeds in a single row in each cell, marginless. Cotyledons accumbent. — Mostly biennials: flowers yellow. (Anciently called The Herb of St. Barbara.)

1. **B. vulgàris,** R. Br. (COMMON WINTER CRESS. YELLOW ROCKET.) Smooth; lower leaves lyrate, the terminal division round; upper leaves obovate, cut-toothed, or pinnatifid at the base; pods convex-4-angled, much thicker than the pedicel, erect, pointed with a manifest style; — or, in the var. STRÍCTA, rather flatter, tipped with a thicker and very short style (B. præcox, *Hook. Fl. Bor.-Am.*, &c.); — or, in var. ARCUÀTA, ascending on spreading pedicels when young. — Low grounds and road-sides. May. — Probably naturalized from Europe. But the varieties here indicated are indigenous from Lake Superior northward and westward. (Eu.)

B. PRǢCOX, R. Br. (B. pàtula, *Fries*), — occasionally cultivated for salad in the Middle States, under the name of *Scurvy-Grass*, — is becoming spontaneous farther south. It is readily known by its longer and less erect pods, scarcely thicker than their pedicels, and by the linear-oblong lobes of most of the stem-leaves.

9. ERÝSIMUM, L. TREACLE MUSTARD.

Pod linear, 4-sided; the valves keeled with a strong midrib. Seeds in a single row in each cell, oblong, marginless. Cotyledons (often obliquely) incumbent. Calyx erect. — Chiefly biennials, with yellow flowers; the leaves not clasping. (Name from ἐρύω, *to draw blisters.*)

1. **E. cheiranthoìdes,** L. (WORM-SEED MUSTARD.) Minutely roughish, branching, slender; leaves lanceolate, scarcely toothed; flowers small; *pods small and short* (7″ - 12″ long), very obtusely angled, ascending on slender *divergent pedicels.* — Banks of streams, New York, Penn., Illinois, and northward: apparently truly indigenous. July. (Eu.)

2. **E. Arkansànum,** Nutt. (WESTERN WALL-FLOWER.) Minutely roughish-hoary; stem simple; leaves lanceolate, somewhat toothed; *pods nearly erect on very short pedicels, elongated* (3′ - 4′ long), exactly 4-sided; stigma 2-lobed. — Ohio (on limestone cliffs) to Illinois, and southwestward. June, July. — Plant stout, 1° - 2° high; the crowded bright orange-yellow flowers as large as those of the Wall-flower.

10. SISÝMBRIUM, L. HEDGE MUSTARD.

Pod terete, flattish, or 4 - 6-sided; the valves 1 - 3-nerved. Seeds oblong, marginless. Cotyledons incumbent. Calyx open. — Flowers small, white or yellow. (An ancient Greek name for some plant of this family.)

1. **S. OFFICINÀLE**, Scop. (HEDGE MUSTARD.) *Leaves runcinate;* flowers very small, pale yellow; *pods close pressed* to the stem, *awl-shaped*, scarcely stalked. ① — Waste places. May - Sept. — An unsightly, branched weed, 2°-3° high. (Nat. from Eu.)

2. **S. THALIÀNUM**, Gaud. (MOUSE-EAR CRESS.) *Leaves obovate or oblong, entire* or barely toothed; flowers white; pods linear, somewhat 4-sided, longer than the slender spreading pedicels. ② — Old fields and rocks, New York to Kentucky, &c. April, May. — A span high, slender, branched, hairy at the base. (Nat. from Eu.)

3. **S. canéscens**, Nutt. (TANSY MUSTARD.) *Leaves 2-pinnatifid*, the divisions small and toothed; flowers whitish or yellowish, very small; pods in long racemes, oblong or rather club-shaped, not longer than the spreading pedicels; seeds irregularly in 2 rows in each cell. ① — Penn. and Ohio to Wisconsin, and southward and westward. — Slender, 1° high, often hoary pubescent.

11. SINÀPIS, Tourn. MUSTARD.

Pod nearly terete, with a short beak (which is either empty or 1-seeded); the valves 3-5- (rarely 1-) nerved. Seeds globose, one-rowed. Cotyledons incumbent, folded around the radicle. Calyx open. — Annuals or biennials, with yellow flowers. Lower leaves lyrate, incised, or pinnatifid. (Greek name Σίναπι, which is said to come from the Celtic *nap*, a turnip.)

1. **S. ÀLBA**, L. (WHITE MUSTARD.) *Pods bristly*, turgid, on spreading pedicels, *shorter than the sword-shaped one-seeded beak;* leaves all pinnatifid. — (Cult. and adv. from Eu.)

2. **S. ARVÉNSIS**, L. (FIELD MUSTARD. CHARLOCK.) *Pods smooth, knotty, about thrice the length of the conical 2-edged usually empty beak;* upper leaves merely toothed. — A noxious weed in cultivated fields, New York and Wisconsin. (Adv. from Eu.)

3. **S. NÌGRA**, L. (BLACK MUSTARD.) *Pods smooth, 4-cornered (the valves 1-nerved only), appressed,* tipped with a slender persistent style (rather than beak); leaves lyrate or lobed, the upper narrow and entire. — Fields and waste places. The acrid seeds furnish the *mustard* of our tables, &c. (Adv. from Eu.)

12. DRÀBA, L. WHITLOW-GRASS.

Pouch oval, oblong, or even linear, flat; the valves plane or slightly convex, 1-3-nerved: partition broad. Seeds several or numerous, in 2 rows in each cell, marginless. Cotyledons accumbent. Calyx equal. Filaments not toothed. — Low herbs, with entire or toothed leaves, and white or yellow flowers. Pubescence mostly stellate. (Name from δράβη, *acrid*, in allusion to the pungency of the leaves.)

§ 1. DRABA, DC. — *Petals undivided.*

* *Perennial, tufted, leafy-stemmed: flowers white: pods twisted when ripe.*

1. **D. ramosíssima**, Desv. *Diffusely much branched* (5′-8′ high), pubescent; *leaves laciniate-toothed*, linear-lanceolate, the lower oblanceolate; ra-

cemes corymbose-branched; *pods hairy*, oval-oblong or lanceolate (2″ - 5″ long), on slender pedicels, tipped with a *long style.* — Cliffs, Harper's Ferry, Natural Bridge, &c., Virginia, to Kentucky River, and southward. April, May.

2. **D. arábisans,** Michx. Slightly pubescent; flowering stems (6′ - 10 high) *erect and mostly simple; leaves* oblong-lanceolate, linear, or the lower spatulate, *sparingly toothed;* racemes short, usually simple; *pods glabrous*, oblong-lanceolate (5″ - 6″ long), on rather short pedicels, tipped with a *very short style.* — Rocky banks, Vermont, Northern New York, Upper Michigan, and northward. May, June. — Petals large.

* * *Annual or biennial: leafy stems short: flowers white or in No. 4 yellow: style none.* (*Leaves oblong or obovate, hairy, sessile.*)

3. **D. brachycárpa,** Nutt. Low (2′ - 4′ high), minutely pubescent, *stems leafy* to the base of the dense, at length elongated raceme; leaves narrowly oblong or the lowest ovate (2½″ - 4″ long), few-toothed or entire; flowers small; *pods smooth, narrowly oblong, acutish* (2″ long), *about the length of the ascending pedicels.* — Dry hills, Illinois, Kentucky, and southward. April.

4. **D. nemoròsa,** L. Leaves oblong or somewhat lanceolate, more or less toothed; *racemes elongated* (4′ - 8′ long in fruit); petals emarginate, small; *pods elliptical-oblong, half the length of the horizontally spreading pedicels*, pubescent (D. nemoralis, *Ehrh.*), or smooth (D. lutea, *DC.*). — Fort Gratiot, Michigan, and northward. (Eu.)

5. **D. cuneifòlia,** Nutt. Leaves obovate, wedge-shaped, or the lowest spatulate, toothed; *raceme somewhat elongated in fruit* (1′ - 3′), at length equalling the naked peduncle; petals emarginate, much longer than the calyx; *pods oblong-linear, minutely hairy, longer than the horizontal pedicels.* — Grassy places, Illinois, Kentucky, and southward. March, April.

6. **D. Caroliniàna,** Walt. Small (1′ - 4″ high); leaves obovate, mostly entire; peduncles scape-like; petals twice the length of the calyx; *raceme short or corymbose in fruit* (½′ - 1′ long); *pods broadly linear, smooth*, much longer than the ascending pedicels. — Sandy fields, Rhode Island to Illinois, and southward. March - June.

7. **D. micrántha,** Nutt. *Pods minutely hairy; flowers small or minute;* raceme sometimes elongated; otherwise as in No. 6. — From Wisconsin southwestward.

§ 2. ERÓPHILA, DC. — Petals 2-cleft. (*Annual or biennial: flowers white.*)

8. **D. vérna,** L. (WHITLOW-GRASS.) Small (scapes 1′ - 3′ high); leaves all radical, oblong or lanceolate; racemes elongated in fruit; pods varying from round-oval to oblong-lanceolate, smooth, shorter than the pedicels. — Sandy waste places and road-sides: not common. April, May. — Not found north of Lower Canada. The same as the plant of Europe, and perhaps introduced. (Eu.)

13. VESICÀRIA, Lam. BLADDER-POD.

Pouch globular and inflated, or more or less flattened parallel to the orbicular partition; the hemispherical or convex thin valves nerveless. Seeds few or sev-

oval, flat. Cotyledons accumbent. Filaments toothless. — Low herbs, pubescent or hoary with stellate hairs. Flowers mostly yellow. (Name from *vesica*, a bladder, from the inflated pods.)

1. **V. Shórtii,** Torr. & Gray. Annual, decumbent, slender, somewhat hoary; leaves oblong, entire or repand; raceme loose; *style filiform, longer than the* (immature) small and *canescent spherical pod; seeds not margined,* 1 - 2 in each cell. — Rocky banks of Elkhorn Creek, near Lexington, Kentucky, *Short.*

2. **V.? Lescùrii,** n. sp. Somewhat pubescent, but green; stems diffusely ascending from a biennial root: *leaves* oblong or oval, sparingly toothed, those of the stem *half-clasping by a sagittate base;* racemes elongated, many-flowered; pedicels ascending; filaments inflated at the base; *style half the length of the hispid* orbicular or broadly oval *flattened pod; seeds wing-margined,* 1 - 4 in each cell. — Hills near Nashville, Tennessee, *Leo Lesquereux.* April, May. — Flowers golden yellow. Pods so flat that, as far as they are concerned, the species should rather belong to Alyssum. Plant to be sought in Southern Kentucky.

14. CAMELÌNA, Crantz. FALSE FLAX.

Pouch obovoid or pear-shaped, pointed, turgid, flattish parallel to the broad partition: valves 1-nerved. Seeds numerous, oblong. Cotyledons incumbent. Style slender. Flowers small, yellow. (Name from *χαμαί, dwarf,* and *λίνον, flax.* It has been fancied to be a sort of degenerate flax.)

1. **C.** SATÌVA, Crantz. Leaves lanceolate, arrow-shaped; pods margined, large. ① — Flax-fields, &c. A noxious weed. (Adv. from Eu.)

15. LEPÍDIUM, L. PEPPERWORT. PEPPERGRASS.

Pouch roundish, much flattened contrary to the narrow partition, usually notched at the apex; the valves boat-shaped and keeled. Seeds 1 in each cell, pendulous. Cotyledons incumbent or in No. 1 accumbent! Flowers small, white. Stamens often only two! (Name from *λεπίδιον, a little scale,* alluding to the small flat pods.) Ours are annuals or biennials.

1. **L. Virgínicum,** L. (WILD PEPPERGRASS.) *Pods orbicular, wingless,* notched; *cotyledons accumbent;* upper leaves lanceolate, toothed or incised; the lowest pinnatifid; *petals* 4; stamens 2. Road-sides. June - Sept. — A weed which has immigrated from farther South.

2. **L. intermèdium,** Gray. *Cotyledons incumbent;* upper leaves linear or lanceolate, entire: otherwise like No. 1. — From Michigan northward and southwestward. — Petals often thrice the length of the calyx.

3. **L.** RUDERÀLE, L. *Pods oval and smaller; cotyledons incumbent; petals none;* stems diffusely much branched: otherwise much as in No. 1. — Road-sides, near towns; sparingly. (Adv. from Eu.)

4. **L.** CAMPÉSTRE, L. *Pods ovate, winged, rough* with minute scales, notched; leaves arrow-shaped, toothed; downy; stamens 6. Fields, sparing from Massachusetts to Delaware. (Adv. from Eu.)

16. CAPSÉLLA, Vent. SHEPHERD'S PURSE.

Pouch inversely heart-shaped-triangular, flattened contrary to the narrow partition; the valves boat-shaped, wingless. Seeds numerous. Cotyledons incumbent. — Annuals: flowers small, white. (Name a diminutive of *capsula*, a pod.)

1. **C.** BURSA-PÁSTORIS, Mœnch. Root-leaves clustered, pinnatifid or toothed; stem-leaves arrow-shaped, sessile. — Waste places; the commonest of weeds. April - Sept. (Nat. from Eu.)

17. SUBULÀRIA, L. AWLWORT.

Pouch oval, turgid, somewhat flattened contrary to the broad partition. Seeds several. Cotyledons long and narrow, incumbently folded transversely, i. e. the cleft extending to the radicular side of the curvature. Style none. — A dwarf stemless perennial, aquatic; the tufted leaves awl-shaped (whence the name). Scape naked, few-flowered, 1′ - 3′ high. Flowers minute, white.

1. **S. aquática,** L. — Margin of lakes in Maine. June, July. (Eu.)

18. SENEBIÈRA, DC. WART-CRESS. SWINE-CRESS.

Pouch flattened contrary to the narrow partition; the two cells indehiscent, but falling away at maturity from the partition as closed nutlets, strongly wrinkled or tuberculate, 1-seeded. Cotyledons as in the last. — Low and diffuse or prostrate annuals or biennials, with minute whitish flowers. Stamens often only 2. (Dedicated to *Senebier*, a distinguished vegetable physiologist.)

1. **S. dídyma,** Pers. Leaves 1 - 2-pinnately parted; *pods notched at the apex, rough-wrinkled.* (S. pinnatífida, *DC.* Lepidium didymum, *L.*) — Waste places, at ports, &c., Virginia and Carolina: an immigrant from farther South.

2. **S.** CORONÓPUS, DC. Leaves less divided, with narrower lobes; *pods not notched at the apex, tubercled.* Virginia, *Pursh.* Rhode Island, *Robbins.* (Adv. from Eu.)

19. CAKÌLE, Tourn. SEA-ROCKET.

Pod short, 2-jointed across, angular, fleshy, the upper joint flattened at the apex, separating at maturity; each indehiscent and 1-celled, 1-seeded; the lower sometimes seedless. Seed erect in the upper, suspended in the lower joint. Cotyledons rather obliquely accumbent. — Sea-side, branching, fleshy annuals. Flowers purplish. (An old Arabic name.)

1. **C. Americàna,** Nutt. (AMERICAN SEA-ROCKET.) Leaves obovate, sinuate and toothed; lower joint of the fruit obovoid, emarginate; the upper ovate, flattish at the apex. — Coast of the Northern States and of the Great Lakes. July - Sept. — Joints nearly even and fleshy when fresh; the upper one 4-angled and appearing more beaked when dry.

20. RÁPHANUS, L. RADISH.

Pods linear or oblong, tapering upwards, 2-jointed; the lower joint often seedless and stalk-like; the upper necklace-form by constriction between the seeds, with no proper partition. Style long. Seeds as in the Mustard Tribe.—Annuals or biennials. (The ancient Greek name from ῥά, *quickly*, and φαίνω, *to appear*, alluding to the rapid germination.)

1. **R.** Raphanístrum, L. (Wild Radish. Jointed Charlock.) Pods necklace-form, long-beaked; leaves lyre-shaped, rough; petals yellow, turning whitish or purplish, veiny.—A troublesome weed in fields, in E. New England and New York. (Adv. from Eu.)

The most familiar representatives of this order in cultivation, not already mentioned, are

Cheiránthus Chèiri, the well-known Wall-flower.

Matthíola ánnua, and other sorts of Stock.

Hésperis matronàlis, the Rocket, which begins to escape from gardens.

Brássica oleràcea, of which the Cabbage, Kohl-Rabi, Cauliflower, and Broccoli are forms: B. campéstris, which furnishes the Swedish Turnip or Rutabaga: and B. Ràpa, the Common Turnip. The latter becomes spontaneous for a year or two in fields where it has been raised.

Ráphanus satìvus, the Radish; inclines sometimes to be spontaneous.

Lunària redivìva, the Moonwort or Honesty, with its broad flat pods.

Iberis umbellàta, the Candy-tuft, and Alyssum maritimum, the Sweet Alyssum.

Lepídium satìvum, the cultivated Peppergrass.

Isàtis tinctòria, the Woad, of the division *Nucumentaceæ*, having indehiscent 1-celled fruit.

Order 13. CAPPARIDÀCEÆ. (Caper Family.)

Herbs (when in northern regions), *with cruciform flowers, but* 6 *or more not tetradynamous stamens, a* 1-*celled pod with* 2 *parietal placentæ, and kidney-shaped seeds.*—Pod as in Cruciferæ, but with no partition, often stalked: seeds similar, but the embryo coiled rather than folded.—Leaves alternate, mostly palmately compound.—Often with the acrid or pungent qualities of Cruciferæ (as is familiar in *capers*, the flower-buds of Cáppaaris spinosa); also commonly bitter and nauseous. Represented within our limits only by the following plant.

1. POLANÍSIA, Raf. Polanisia.

Sepals 4. Petals 4, with claws, notched at the apex. Stamens 8–32, unequal. Receptacle not elongated, bearing a gland behind the base of the ovary. Pod stalkless or nearly so, linear or oblong, veiny, turgid, many-seeded.—Fetid annuals, with glandular or clammy hairs. Flowers in leafy racemes. (Name from πολύς, *many*, and ἄνισος, *unequal*, points in which the genus differs in its stamens from Cleome.)

1. **P. gravèolens,** Raf. Leaves with 3 oblong leaflets; stamens about 11, scarcely exceeding the petals; style short; pod slightly stalked.—Gravelly

banks from Lake Champlain and Pennsylvania to Wisconsin and Kentucky. June–Aug.—Flowers small: calyx and filaments purplish: petals yellowish-white.

ORDER 14. RESEDÀCEÆ. (MIGNONETTE FAMILY.)

Herbs, with unsymmetrical 4–7-merous small flowers, with a fleshy one-sided hypogynous disk between the petals and the (3–40) *stamens, bearing the latter. Calyx not closed in the bud. Pod* 3–6*-lobed,* 3–6*-horned,* 1*-celled with* 3–6 *parietal placentæ, opening at the top before the seeds* (which are as in Order 13) *are full grown.*—Leaves alternate. Flowers in terminal spikes or racemes.—A small and unimportant family, of the Old World, represented by the Mignonette (*Reseda odorata*) and the Dyer's Weed.

1. RESÈDA, L. MIGNONETTE. DYER'S ROCKET.

Petals 4–7, often cleft, unequal. Stamens 10–40, turned to one side. (Deriv. from *resedo*, to calm or assuage, in allusion to supposed sedative properties.)

I. **R. LUTÈOLA**, L. (DYER'S WEED or WELD.) Leaves lanceolate; calyx 4-parted; petals 4, greenish-yellow; the upper one 3–5-cleft, the two lateral 3-cleft, the lower one linear and entire; pods depressed. ① — Road-sides in W. New York, &c.—Plant 2° high. Used for dyeing yellow. (Adv. from Eu.)

ORDER 15. VIOLÀCEÆ. (VIOLET FAMILY.)

Herbs, with a somewhat irregular 1*-spurred corolla of* 5 *petals,* 5 *hypogynous stamens with adnate introrse anthers conniving over the pistil, and a* 1*-celled* 3*-valved pod with* 3 *parietal placentæ.*— Sepals 5, persistent. Petals imbricated in the bud. Stamens with their short and broad filaments continued beyond the anther-cells, and often coherent with each other. Style usually club-shaped, with the simple stigma turned to one side and hollow. Valves of the capsule bearing the several-seeded placentæ on their middle. Seeds anatropous, rather large, with a hard seed-coat, and a large and straight embryo nearly as long as the albumen: cotyledons flat.— Leaves alternate, with stipules. Flowers axillary, nodding. (Roots slightly acrid, or emetic.)—Two genera in the Northern United States.

1. SÒLEA, Ging., DC. GREEN VIOLET.

Sepals not prolonged at the base. Petals nearly equal in length, but the lower one larger and gibbous or saccate at the base, more notched than the others at the apex. Stamens completely united into a sheath enclosing the ovary, and bearing a broad gland on the lower side. Style hooked at the summit.—A homely perennial herb, with stems leafy to the top, and 1–3 small greenish-white flowers in the axils, on short recurved pedicels. (Named in honor of *W Sole*, author of an essay on the British Mints.)

1. **S. cóncolor,** Ging. (Viola concolor, *Pursh*, &c.) — Woods, New York to Illinois and southward. June. — Plant 1°-2° high. Leaves oblong, pointed at both ends, entire. Pod 1′ long: after opening, each valve as it dries folds together lengthwise firmly, projecting the large round seeds to a considerable distance. The same thing occurs in many Violets.

2. VÌOLA, L. VIOLET. HEART'S-EASE.

Sepals extended or eared at the base. Petals somewhat unequal, the lower one spurred at the base. Stamens closely surrounding the ovary, often slightly cohering with each other; the two lower ones bearing spurs which project into the spur of the corolla. (The ancient Latin name of the genus.)

* *Stemless; the leaves and scapes all from subterranean or prostrate rootstocks; perennial.* (*Commonly producing apetalous flowers all summer long, on shorter peduncles concealed under the leaves, or on runners: these ripen seed much more freely than the ordinary blossoms.*)

+- *Flowers light yellow* (*small; spur very short*).

1. **V. rotundifòlia,** Michx. (ROUND-LEAVED VIOLET.) Leaves round-ovate, heart-shaped, slightly crenate; lateral petals bearded and marked with brown lines. — Cold woods, Maine to Michigan, and south along the Alleghanies. April, May. — Smoothish: leaves 1′ broad at flowering, increasing to 3′ or 4′ in the summer, then close pressed to the ground, shining above.

+- +- *Flowers white; the lower petals veined with lilac: spur short.*

2. **V. lanceolàta,** L. (LANCE-LEAVED VIOLET.) Smooth; *leaves lanceolate, erect,* blunt, *tapering into a long petiole,* almost entire; petals beardless. — Damp soil, Maine to Michigan, Kentucky, and southward; common near the coast. May.

3. **V. primulæfòlia,** L. (PRIMROSE-LEAVED VIOLET.) Smooth or a little pubescent; *leaves oblong or ovate, abrupt or somewhat heart-shaped at the base;* petals often acute, the lateral ones usually sparingly bearded. (V. acùta, *Bigelow.*) — Damp soil; with No. 2: intermediate between it and No. 4.

4. **V. blánda,** Willd. (SWEET WHITE VIOLET.) *Leaves round-heart-shaped or kidney-form,* minutely pubescent; petals beardless. — Damp places, Maine to Wisconsin and Kentucky. April, May. — Flowers small, faintly sweet-scented.

+- +- +- *Flowers violet or blue.*

5. **V. palústris,** L. (MARSH VIOLET.) Smooth; leaves round-heart-shaped and kidney-form, slightly crenate; *flowers* (small) *pale lilac* with purple streaks, nearly beardless; *spur very short* and obtuse. — Alpine summits of the White Mountains, New Hampshire; June. (Eu.)

6. **V. Selkírkii,** Goldie. (GREAT-SPURRED VIOLET.) Leaves round-heart-shaped with a deep narrowed sinus, hairy above, lying flat on the ground; *spur nearly as long as the beardless petals, thickened at the end;* anther-spurs very long. — Shaded hills, W. Massachusetts and the adjacent parts of New York, thence northward. May. — A rare and delicate species, 2′ high; the flowers large in proportion.

7. **V. cucullàta,** Ait. (COMMON BLUE VIOLET.) *Leaves all long-petioled and upright, heart-shaped with a broad sinus,* varying to kidney-shaped and dilated-triangular, smooth, or more or less pubescent, the sides at the base rolled inwards when young, obtusely serrate; *lateral and often the lower petals bearded;* spur short and thick; stigma obscurely beaked or beakless. — Low grounds, common everywhere. April - June. — Very variable in size, &c. and in the color and size of the (usually large) flowers, which are deep or pale violet-blue or purple, sometimes nearly white, or variegated with white. Scapes 3′ - 10′ high. Passes by intermediate forms of all sorts into

Var. **palmàta.** (HAND-LEAF VIOLET.) *Leaves variously 3 - 7-cleft* or parted, or the earlier ones entire on the same individual. (V. palmàta, *L.*) — Common, especially southward.

8. **V. villòsa,** Walt., Nutt. (HAIRY VIOLET.) *Leaves mostly short-petioled and lying flat on the ground, orbicular or round-heart-shaped with a narrow or closed sinus,* hairy especially above, or nearly smooth, thickish; lateral and mostly the lower petals bearded; spur short and thick; stigma beaked. (V. cordifolia, *Schwein.* V. soròria, *Le Conte,* &c., scarcely of *Willd.*) — Dry hills and woods, Pennsylvania, Kentucky, and southward. April, May. — Smaller than the last, 2′ - 4′ high: "corolla reddish-blue." Probably only a round leaved variety of the next.

9. **V. sagittàta,** Ait. (ARROW-LEAVED VIOLET.) Smoothish or hairy; *leaves on short and margined,* or the later often on long and naked *petioles,* varying from *oblong-heart-shaped to halberd-shaped, arrow-shaped, oblong-lanceolate or ovate,* denticulate, sometimes cut-toothed near the base, the lateral or occasionally all the (purple-blue) petals bearded; spur short and thick; stigma beaked. (V. ovàta, *Nutt.,* & V. emarginàta, *Le Conte,* are states of this variable species.) — Dry or moist open places, New England to Illinois and southward. April, May. — Flowers rather large.

10. **V. delphinifòlia,** Nutt. (LARKSPUR VIOLET.) *Leaves all palmately or pedately 5 - 7-parted,* the divisions 2 - 3-cleft; lobes linear; *lateral petals bearded;* stigma short-beaked. — Rich prairie soil, Illinois and westward. April. — Much resembles the next.

11. **V. pedàta,** L. (BIRD-FOOT VIOLET.) Nearly smooth; *leaves all 3 - 5-divided,* or the earliest only parted, the lateral divisions 2 - 3-parted, all linear or narrowly spatulate, sometimes 2 - 3-toothed or cut at the apex; *petals beardless;* stigma nearly beakless. — Sandy or gravelly soil, New England to Illinois and southward. May. — Flower large and handsome, 1′ broad, pale or deep lilac-purple or blue; the two upper petals sometimes deep violet and velvety like a Pansy.

* * *Leafy-stemmed, from subterranean perennial rootstocks.*

Stems leafy from the base to the summit, branching: flowers not yellow, sometimes produced all summer long.

12. **V. rostràta,** Pursh. (LONG-SPURRED VIOLET.) Stems ascending (3′ - 6′ high); leaves roundish-heart-shaped, serrate, the upper acute; stipules lanceolate, fringe-toothed, large; *spur slender, longer than the pale violet beardless petals;* style straight and slender; stigma terminal, beakless. — Shaded hill-

sides, Maine to Ohio and Kentucky; rare. June, July. — Spur ½′ long. Anther-spurs also very long.

13. **V. Muhlenbérgii,** Torr. (AMERICAN DOG VIOLET.) Stems ascending (3′ – 7′ long), at length with creeping branches; leaves round-heart-shaped, or the lowest kidney-form, crenate, the uppermost slightly pointed; stipules lanceolate, fringe-toothed; *spur cylindrical, about half the length of the pale violet petals,* the lateral ones slightly bearded; stigma beaked. — Shaded wet places; common. May, June.

14. **V. striàta,** Ait. (PALE VIOLET.) Stems angular, ascending, branching (6′ – 10′ high); leaves heart-shaped, finely serrate, often acute; stipules oblong-lanceolate, large, strongly fringe-toothed; *spur thickish, much shorter than the cream-colored petals,* the lateral ones bearded, the lower striped with purplish lines; stigma beaked. — Low grounds; common, especially westward. April – Oct.

15. **V. Canadénsis,** L. (CANADA VIOLET.) Upright (1° – 2° high); leaves heart-shaped, pointed, serrate; *stipules ovate-lanceolate, entire;* petals white or whitish inside, the upper ones tinged with violet beneath, the lateral bearded; *spur very short;* stigma beakless, hairy on each side. — Rich woods; common northward and along the Alleghanies. May – Aug.

+ + *Stems mostly simple, erect, naked below, and 2 – 4-leaved above: stipules nearly entire: flowers yellow: stigma not beaked, but bearded on each side.*

16. **V. pubéscens,** Ait. (DOWNY YELLOW VIOLET.) Softly pubescent (6′ – 12′ high); *leaves very broadly heart-shaped,* toothed, somewhat pointed; stipules ovate or ovate-lanceolate, large; spur extremely short; lower petals veined with purple. — Woods; common. May – Aug.

Var. **eriocárpa,** Nutt. More pubescent, stout, 1° – 2° high; pods wooly. (V. eriocarpa, *Schwein.*) — Common westward.

Var. **scabriuscula,** Torr. & Gray. Smaller and greener, slightly pubescent; stems often decumbent (4′ – 10′ high). — Rhode Island to Ohio and Kentucky.

17. **V. hastàta,** Michx. (HALBERD-LEAVED VIOLET.) Nearly glabrous, slender (4′ – 10′ high); *stem-leaves halberd-shaped,* slightly serrate, acute; stipules ovate, small; spur very short. — Mountains of Pennsylvania and southward. June.

* * * *Leafy-stemmed annuals or biennials: the 4 upper petals ascending.*

18. **V.** TRÍCOLOR, L. (PANSY. HEART'S-EASE.) Stem angled and branched; leaves roundish, or the upper oval and the lowest heart-shaped, crenate or entire; stipules very large and leaf-like, lyrate-pinnatifid; petals variable in color or variegated (yellow, whitish, violet-blue and purple); — in var. ARVÉNSIS shorter or rather longer than the calyx. — Dry or sandy soil, New York to Kentucky and southward: doubtless only a small state of the Garden Pansy run wild. (Nat. from Eu.)

V. ODORÀTA, the SWEET VIOLET of Europe, which far excels all the American species in fragrance, sometimes grows spontaneously near dwellings.

ORDER 16. CISTÀCEÆ. (ROCK-ROSE FAMILY.)

Low shrubs or herbs, with regular flowers, distinct and hypogynous mostly indefinite stamens, a persistent calyx, a 1-celled 3 – 5-valved pod with as many parietal placentæ borne on the middle of the valves, and orthotropous albuminous seeds. — Sepals 5; the two external small, like bracts, or sometimes wanting; the three others a little twisted in the bud. Petals 3 or 5, usually fugacious, convolute in the opposite direction from the calyx in the bud. Anthers short, innate, on slender filaments. Style single or none. Ovules few or many, on slender stalks, with the orifice at their apex. Embryo long and slender, straightish or curved, in mealy albumen: cotyledons narrow. — Leaves simple and mostly entire, the lower usually opposite, and the upper alternate. (Inert plants. A small family: mostly of the Mediterranean region.)

Synopsis.

1. HELIANTHEMUM. Petals 5, crumpled in the bud, fugacious. Stamens and ovules numerous in the petal-bearing flowers. Style none.
2. HUDSONIA. Petals 5, fugacious. Stamens 9 – 30. Style long and slender. Pod strictly 1-celled, 2 - 6-seeded.
3. LECHEA. Petals 3, persistent. Stamens 3 – 12. Style none. Pod partly 3-celled, the imperfect partitions bearing broad 2-seeded placentæ.

1. HELIÁNTHEMUM, Tourn. ROCK-ROSE.

Petals 5, crumpled in the bud, fugacious. Style short or none: stigma 3-lobed. Capsule strictly 1-celled. Embryo curved in the form of a hook or ring. — Flowers in most N. American species of two sorts, viz., 1. the *primary*, or earliest ones, with large petals, indefinitely numerous stamens, and many-seeded pods: 2. *secondary*, or later ones, which are much smaller and in clusters, with small petals or none, 3 – 10 stamens, and much smaller 3 – few-seeded pods. The yellow flowers open only once, in sunshine, and cast their petals by the next day. (Name from *ἥλιος, the sun*, and *ἄνθεμον, flower.*)

1. **H. Canadénse,** Michx. (FROST-WEED.) *Petal-bearing flowers solitary; the small secondary flowers clustered in the axils of the leaves,* nearly sessile; calyx of the large flowers hairy-pubescent; of the small ones hoary, like the stem and lower side of the lanceolate-oblong leaves. — A variety is more hoary, and with a stronger tendency to multiply the minute clustered flowers. — Sandy or gravelly dry soil, Maine to Wisconsin and southward, but rare west of the Alleghanies. June - Aug. — Stems at first simple. Corolla of the large flowers 1′ wide, producing pods 3″ long: pods of the smaller flowers not larger than a pin's head. — Late in autumn, crystals of ice shoot from the cracked bark at the root, whence the popular name.

2. **H. corymbòsum,** Michx. *Flowers all clustered at the summit* of the stem or branches, the petal-bearing ones at length on slender stalks; calyx woolly. — Pine barrens, New Jersey and southward along the coast.

2. HUDSÒNIA, L. HUDSONIA.

Petals 5, fugacious (lasting but a day), much larger than the calyx. Stamens 9 - 30. Style long and slender: stigma minute. Pod oblong, enclosed in the calyx, strictly 1-celled, with 1 or 2 seeds attached near the base of each nerve-like placenta. Embryo coiled into the form of a closed hook. — Bushy heath-like little shrubs (seldom a foot high), covered all over with the small awl-shaped or scale-like persistent downy leaves, producing numerous (small but showy) bright yellow flowers crowded along the upper part of the branches. (Named in honor of *Hudson*, an English botanist contemporary with Linnæus.)

1. **H. ericoìdes,** L. Downy but greenish; leaves awl-shaped, loose; flowers on slender naked stalks. — Dry sandy soil near the coast, Maine to Virginia: extending interior as far as Conway, New Hampshire. May.

2. **H. tomentòsa,** Nutt. Hoary with down; leaves oval or oblong, close-pressed and imbricated; flowers sessile. — Sandy coasts from Maine to Maryland, and on the Great Lakes from Champlain to Superior. May, June. — Flowers 5′′ broad.

3. LÉCHEA, L. PINWEED.

Petals 3, narrow, flat in the bud: not longer than the calyx, withering-persistent. Stamens 3 - 12. Style scarcely any: stigmas 3, plumose. Pod globular, appearing partly 3-celled; the 3 broad and thin placentæ borne on imperfect partitions, each bearing 2 seeds on the face towards the valve: in our species, the placentæ curve backwards and partly enclose the seeds. Embryo straightish. — Homely perennial herbs, with very small greenish or purplish flowers. (Named in honor of *Leche*, a Swedish botanist.)

1. **L. màjor,** Michx. *Hairy;* stem upright, simple, producing slender prostrate branches from the base; *leaves elliptical,* mucronate-pointed, alternate and opposite or sometimes whorled; *flowers densely crowded* in panicled clusters; pedicels shorter than the globose-depressed (very small) pods. — Sterile woodlands; Maine to Kentucky and southward, chiefly eastward. July - Sept. — Plant 1° - 2° high, stout.

2. **L. thymifòlia,** Pursh. *Hoary with appressed hairs,* especially the decumbent stout leafy shoots from the base; flowering stems ascending, loosely branched, with the *leaves linear or oblanceolate; those of the shoots elliptical,* whorled, crowded; *flowers scattered* in small and loose clusters; pedicels as long as the globose pods. — Sandy coast, Maine to New Jersey and southward. July - Sept. — Scarcely a foot high, tufted, rigid; the pods larger than in No. 1.

3. **L. mìnor,** Lam. *Minutely hairy;* stems slender, upright or diffuse; leafy shoots densely tufted at the base; *leaves linear; flowers loosely racemed* on the slender branchlets; pedicels mostly longer than the globose pods. — Dry open soil; common. June - Sept. — Plant 5′ - 15′ high, slender, running into numberless variations according to the soil, season, and exposure. Pods smaller than in No. 2.

ORDER 17. DROSERÀCEÆ. (SUNDEW FAMILY.)

Bog-herbs, mostly glandular-haired, with regular hypogynous flowers, pentamerous and withering-persistent calyx, corolla, and stamens, the anthers fixed by their middle and turned outwards, and a 1-celled pod with twice as many separate styles or stigmas as there are parietal placentæ. — Calyx imbricated. Petals convolute. Seeds numerous, anatropous, with a short and minute embryo at the base of the albumen. — Leaves circinate in the bud, i. e. rolled up from the apex to the base as in Ferns. (A small family, of no known qualities, except a slight bitterness, &c.; the Sundews impart a purple stain to paper in which they are dried.) Only one genus within our limits, viz.

1. DRÓSERA, L. SUNDEW.

Stamens 5. Styles 3, or sometimes 5, deeply 2-parted so that they are taken for 6 or 10, slender; stigmatose above on the inner face. Pod globular or oblong, 3- (rarely 5-) valved, the valves bearing the numerous seeds on their middle for the whole length. — Low perennials; the leaves clothed with reddish gland-bearing bristles, in our species all in a tuft at the base; the naked scape bearing the flowers in a 1-sided raceme-like inflorescence, which nods at the undeveloped apex, so that the fresh-blown flower (which opens only in sunshine) is always highest. (The glands of the leaves exude drops of a clear fluid, glittering like dew-drops, whence the name, from δροσερός, *dewy*.)

1. **D. rotundifòlia,** L. (ROUND-LEAVED SUNDEW.) *Leaves orbicular,* abruptly narrowed into the *spreading hairy petioles;* seeds spindle-shaped, the coat loose and chaff-like; flowers white, the parts sometimes in sixes. — Peat-bogs, common, especially northward. July – Aug. (Eu.)

2. **D. longifòlia,** L. *Leaves spatulate-oblong,* tapering into the long rather *erect naked petioles;* seeds oblong, with a rough close coat; flowers white. (D. intermedia, *Hayne.*) — Bogs, chiefly northward and eastward. June – Aug. — Plant raised on its prolonged caudex when growing in water. (Eu.)

3. **D. lineàris,** Goldie. (SLENDER SUNDEW.) *Leaves linear,* obtuse, the blade (2′ – 3′ long, scarcely 2″ wide) *on naked erect petioles* about the same length; seeds oblong, with a smooth and perfectly close coat; flowers white. — Shore of Lake Superior. July.

4. **D. filifórmis,** Raf. (THREAD-LEAVED SUNDEW.) *Leaves very long and filiform,* erect, with no distinction between the blade and the stalk; seeds spindle-shaped; flowers numerous, purple rose-color (½′ broad). — Wet sand, near the coast, Plymouth, Massachusetts, to New Jersey, Delaware, and southward. Aug. — Scapes 6′ - 12′ high; and the singular leaves nearly as long.

DIONÆA MUSCÍPULA, Ellis, the VENUS'S FLY-TRAP, — so noted for the extraordinary irritability of its leaves, closing forcibly at the touch, — is a native of the sandy savannas of the eastern part of North Carolina. It differs in several respects from the character of the order given above; the stamens being 15, the styles united into one, and the seeds all at the base of the pod.

ORDER 18. PARNASSIÀCEÆ. (PARNASSIA FAMILY.)

Character that of the single genus Parnassia, technically most like Hypericaceæ, but the leaves alternate and dotless, — sometimes clearly perigynous, and therefore perhaps nearer Saxifragaceæ, — the 4 *sessile stigmas situated directly over the parietal placentæ!*

1. PARNÁSSIA, Tourn. GRASS OF PARNASSUS.

Sepals 5, imbricated in the bud, persistent. Petals 5, veiny, spreading, at length deciduous, imbricated in the bud: a cluster of somewhat united gland-tipped sterile filaments at the base of each. Proper stamens 5, alternate with the petals: filaments persistent: anthers opening inwards. Ovary 1-celled, with 4 projecting parietal placentæ: stigmas 4, sessile, directly over the placentæ. Pod 4-valved, the valves bearing the placentæ on their middle. Seeds very numerous, anatropous, with a thick wing-like seed-coat and no albumen. Embryo straight: cotyledons very short. — Perennial smooth herbs, with the entire leaves chiefly radical, and the solitary flowers terminating the long naked stems. Petals white, with greenish or yellowish veins. (Named from Mount Parnassus: called Grass of Parnassus by Dioscorides.)

1. **P. palústris,** L. *Petals sessile;* rather longer than the calyx, few-veined; *sterile filaments* 9 – 15 *in each set, slender.* — Shore of Lake Superior, Upper Michigan, and northward. Aug. — Stalks 3′ – 10′ high. Leaves all heart-shaped. Flower nearly 1′ broad. (Eu.)

2. **P. Caroliniàna,** Michx. *Petals sessile,* more than twice the length of the calyx, many-veined; *sterile filaments* 3 *in each set, stout, distinct almost to the base.* — Wet banks, New England to Wisconsin and southward, especially along the mountains. July - Sept. — Leaves thickish, ovate or rounded, often heart-shaped, usually but one on the stalk, and that low down and clasping. Stalk 1° - 2° high. Flower 1′ – 1½′ broad.

3. **P. asarifòlia,** Vent. *Petals abruptly contracted into a claw* at the base; *sterile filaments* 3 *in each set; leaves rounded kidney-shaped:* otherwise as in No. 2. — High Alleghanies of Virginia, and southward.

ORDER 19. HYPERICÀCEÆ. (ST. JOHN'S-WORT FAMILY.)

Herbs or shrubs, with opposite entire dotted leaves and no stipules, regular hypogynous flowers, the petals mostly oblique and convolute in the bud, and many or few stamens commonly collected in 3 *or more clusters or bundles. Pod* 1-*celled with* 2 – 5 *parietal placentæ, and as many styles, or* 3 – 5-*celled by the union of the placentæ in the centre: dehiscence septicidal.* — Sepals 4 or 5, imbricated in the bud, herbaceous, persistent. Petals 4 or 5, mostly deciduous. Pod 2 – 5- (rarely 6 – 7-) lobed, with as many persistent styles, which are at first sometimes united. Seeds very numerous, small, anatropous, with no albumen. Embryo cylindrical; the cotyledons very short. — Plants with a resinous juice (of acrid and balsamic qualities), dotted with pellucid or dark glands, usually smooth. Leaves mostly sessile. Flowers solitary or cymose.

Synopsis.

1. ASCYRUM. Sepals 4, very unequal. Petals 4, oblique, convolute, yellow.
2. HYPERICUM. Sepals 5. Petals 5, oblique, convolute, yellow.
3. ELODEA. Sepals 5. Petals 5, equal-sided, imbricated, naked, purplish. Glands 3.

1. ÁSCYRUM, L. St. Peter's-wort.

Sepals 4; the 2 outer very broad and leaf-like; the inner much smaller. Petals 4, oblique, very deciduous, convolute in the bud. Stamens numerous; the filaments distinct and scarcely in clusters. Pod strictly 1-celled, 2 – 4-valved. — Low, rather shrubby plants, with pale black-dotted leaves, and nearly solitary pale yellow flowers. (Name from *a*, *without*, and *σκίρος*, *roughness*, being very smooth plants.)

1. **A. stàns,** Michx. (St. Peter's-wort.) Stem simple or branched above, 2-edged, 1° – 2° high, stout; *leaves oval or oblong, somewhat clasping*, thickish; *petals obovate;* styles 3 – 4. — Pine barrens, Long Island, New Jersey, and southward. July, Aug. — Flowers showy, almost sessile: outer sepals round-heart-shaped.

2. **A. Crux-Ándreæ,** L. (St. Andrew's Cross.) Low, much branched and decumbent; *leaves narrowly obovate-oblong, contracted at the base*, thin; *petals linear-oblong;* styles 2, very short; pod flat. — Pine barrens, New Jersey to Kentucky, and southward. July - Sept. — Petals scarcely exceeding the outer sepals, approaching each other in pairs over them, in the form of a St. Andrew's cross.

2. HYPÉRICUM, L. St. John's-wort.

Sepals 5, somewhat equal. Petals 5, oblique, convolute in the bud. Stamens numerous or few, united or clustered in 3 – 5 parcels: no interposed glands. Pod 1- or 3 – 5-celled. Seeds usually cylindrical. — Herbs or shrubs, with cymose yellow flowers. (An ancient name, of obscure origin.)

§ 1. *Stamens very numerous, 5-adelphous: pod 5- (rarely 6 – 7-) celled, with the placentæ turned far back into the cells: herbáceous, perennial: flowers very large.*

1. **H. pyramidàtum,** Ait. (Great St. John's-wort.) Branches 2 – 4-angled; leaves ovate-oblong, partly clasping; petals narrowly obovate, not deciduous until after they wither; stigmas capitate. — Banks of rivers, rare, W. New England to Wisconsin and Illinois. July. — Plant 3° – 5° high. Leaves 2′ – 3′ long. Petals 1′ long. Pod ¾′ long, conical.

§ 2. *Stamens very numerous: pod 3 – 5-celled by the union of the placentæ, which are seed-bearing on the outer face.*

* *Shrubs, leafy to the top: styles (at first united) and cells of the pod 3 or 5: calyx leafy, spreading: stamens scarcely at all clustered.*

2. **H. Kalmiànum,** L. Bushy, 1°–3° high; branches 4-angled branchlets 2-edged; leaves crowded, *glaucous*, oblanceolate; flowers few in a cluster; *pods ovate 5-celled.* — Wet rocks, Niagara Falls and Northern lakes. Aug. — Leaves 1′–2′ long. Flowers 1′ wide.

3. **H. prolíficum,** L. (SHRUBBY ST. JOHN'S-WORT.) Branchlets 2-edged; leaves lanceolate-oblong, mostly obtuse, narrowed at the base; flowers numerous, in simple or compound clusters; *pods oblong, 3-celled.* — New Jersey to Michigan, Illinois, and southward. July–Sept. — Shrub 1°–4° high, with long rather simple shoots, leaves 2′ long and ½′ or more wide, and flowers ¾′–1 in diameter. Varies greatly in size, &c.

Var. **densiflòrum.** Exceedingly branched above, 1°–6° high, the branches slender and crowded with smaller leaves; flowers smaller (½′–⅝′ in diameter) and more numerous, in crowded compound cymes. (H. densiflorum, & H. galioides, *Pursh.*) — Pine barrens of New Jersey, and glades of Western Maryland, Kentucky, and southward.

* * *Perennial herbs: styles (diverging) and cells of the pod 3: petals and anthers with black dots: calyx erect: stamens distinctly in 3 or 5 clusters.*

4. **H.** PERFORÀTUM, L. (COMMON ST. JOHN'S-WORT.) Stem much branched and corymbed, somewhat 2-edged (producing runners from the base); leaves elliptical-oblong or linear-oblong, with pellucid dots; petals (deep yellow) twice the length of the *lanceolate acute sepals;* flowers numerous, in open leafy cymes. — Pastures and meadows, &c. June–Sept. — Too well known everywhere as a pernicious weed, which it is difficult to extirpate. Its juices are very acrid. (Nat. from Eu.)

5. **H. corymbòsum,** Muhl. Conspicuously marked with both black and pellucid dots; stem terete, sparingly branched; leaves oblong, somewhat clasping; *flowers crowded* (small); petals pale yellow, much longer than the *oblong sepals.* — Damp places; common. July–Sept. — Leaves larger and flowers much smaller than in No. 4; the petals 2″–3″ long, marked with black lines as well as dots.

§ 3. *Stamens very numerous, obscurely clustered: pod 1-celled, or incompletely 3-celled, the 3 placentæ sometimes borne on short partitions, but not joined in the centre: perennial herbs or low shrubs.*

* *Sepals foliaceous and spreading, unequal: styles more or less united into one.*

6. **H. ellípticum,** Hook. Stem simple, herbaceous (1° high), obscurely 4-angled; *leaves spreading, elliptical-oblong,* obtuse, thin; cyme nearly naked, rather few-flowered; *sepals oblong; pods ovoid, very obtuse,* purple, 1-celled. — Wet places, New England and Pennsylvania to Lake Superior and northward. July, Aug. — Petals light yellow, 3″ long.

7. **H. adpréssum,** Barton. Stem simple, herbaceous, or slightly woody at the base (1°–2° high), obscurely 4-angled below and 2-edged above; *leaves ascending, lanceolate* or linear-oblong, often acute, thin; cyme leafy at the base, few-flowered; *sepals linear-lanceolate; pods ovoid-oblong, incompletely* 3–4-*celled.* — Moist places, Rhode Island (*Olney*), New Jersey, Pennsylvania and southwestward. July, Aug. — Leaves 1½′ long. Petals bright yellow, 3 – 5″ long.

8. **H. dolabrifórme,** Vent. Stems branched from the decumbent base, woody below (6′–20′ high), terete; *leaves linear-lanceolate*, widely spreading, veinless; cyme leafy, few-flowered; *sepals oblong- or ovate-lanceolate*, about the length of the very oblique petals (5″–6″ long); *pods ovate-conical, pointed, strictly* 1-*celled*, the walls very thick and hard. (H. procumbens, *Michx.*) — Dry hills and rocks, Barrens of Kentucky and westward. June – Aug.

9. **H. sphærocárpon,** Michx. Stem simple or branched above, herbaceous, scarcely angular (1°–2° high); *leaves* widely spreading, *oblong-linear* or lanceolate, very obtuse, thickish, nearly veinless; cyme compound and many-flowered, flat, naked; *sepals ovate; pods depressed-globular, strictly* 1-*celled*, rather thin. — Rocky banks of the Ohio and Kentucky Rivers. July, Aug. — Petals about 3″ long.

10. **H. nudiflòrum,** Michx. Stems branched, woody at the base, sharply 4-angled or almost winged above (1°–4° high); *leaves oblong or oval-lanceolate*, obtuse, obscurely veined, pale; cyme compound, many-flowered, naked; *sepals oblong; pods ovate-conical, pointed, almost* 3-*celled*. — Low grounds, Pennsylvania to Kentucky and southward. July. — Petals 3″–4″ long.

* * *Sepals herbaceous, erect, equal: styles* 3, *separate.*

11. **H. angulòsum,** Michx. Stem slender, strict, simple, sharply 4-angled, herbaceous (1°–2° high); leaves opaque, ovate or oblong-lanceolate, acute (½′–1′ long), ascending, closely sessile by a broad base; cyme compound, naked, the branches prolonged and ascending, with the scattered flowers raceme-like; sepals enclosing the ovoid 1-celled pod. — Wet pine barrens of New Jersey and southward. July – Sept. — Petals copper-yellow, 4″–5″ long, much longer than the calyx, furnished with a tooth on one side.

§ 4. *Stamens* 5 – 12, *distinct or in* 3 *clusters: pod* (*brown-purple*) 1-*celled, with* 3 *strictly parietal placentæ: styles short, distinct: petals oblong or linear, small: sepals narrow, erect: slender annuals, with* 4-*angular branches.*

12. **H. mùtilum,** L. Stem flaccid, widely branching (6′–10′ high); *leaves ovate or oblong, obtuse, partly clasping,* 5-*nerved;* cymes leafy; *pods ovate-conical, rather longer than the calyx.* (H. parviflorum, *Muhl.*) — Low grounds, everywhere. — Flowers 2″ broad.

13. **H. Canadénse,** L. Stem strict (6′–20′ high), with the branches erect; *leaves linear or lanceolate,* 3-*nerved* at the base; cymes naked; *pods conical-oblong, usually much longer than the calyx.* — Wet, sandy soil: common. June – Oct. — Flowers copper-yellow, 2″–3″ broad when expanded.

14. **H. Drummóndii,** Torr. & Gray. Stem and the mostly alternate bushy branches rigid, erect (10′–18′ high); *leaves linear-subulate*, nearly erect, 1-*nerved* (3″–9″ long); *flowers scattered* along the upper part of the leafy branches, *short-pedicelled; pods ovoid, not longer than the calyx.* (Sarothra Drummondii, *Grev. & Hook.*) — W. Illinois and southward, in dry soil. July – Oct. — Sepals 2″–3″ long, mostly exceeding the petals.

15. **H. Saròthra,** Michx. (ORANGE-GRASS. PINE-WEED.) Stem and bushy branches thread-like, wiry (4′–9′ high); *leaves minute awl-shaped scales, appressed; flowers minute, mostly sessile* and scattered along the erect branches;

pods ovate-lanceolate, acute, *much longer than the calyx*. (Sarothra gentianoides, *L.*) — Sandy fields; common. June - Oct.

H. GRAVÈOLENS, *Buckley*, a species with foliage like No. 5, but with large flowers, & H. BÚCKLEYI, *Curtis*, a low suffruticose species with large flowers, both natives of the mountains of Carolina, may be expected in those of Virginia.

2. ELODÈA, Pursh. MARSH ST. JOHN'S-WORT.

Sepals 5, equal, erect. Petals 5, equal-sided, oblong, naked, imbricated in the bud. Stamens 9 (rarely 12 or 15), united in 3 sets; the sets separated by as many large and ovate orange-colored glands. Pod 3-celled, oblong: styles distinct. — Perennial herbs, growing in marshes or shallow water, with small close clusters of flesh-colored flowers in the axils of the leaves and at the summit of the stem. (Name from ἑλώδης, *growing in marshes*.)

1. **E. Virgínica,** Nutt. *Leaves closely sessile or clasping by a broad base*, oblong or ovate, very obtuse; filaments united below the middle. (Hypericum Virginicum, *L.*) — Common in swamps. July, Aug.

2. **E. petiolàta,** Pursh. *Leaves tapering into a short petiole, oblong:* filaments united beyond the middle. — From New Jersey southward and westward.

ORDER 20. ELATINÀCEÆ. (WATER-WORT FAMILY.)

Little marsh annuals, with opposite dotless leaves and membranaceous stipules, minute axillary flowers like Chickweeds, *but the pod* 2 - 5*-celled, and the seeds as in* St. John's-wort. — The principal genus is

1. ELÁTINE, L. WATER-WORT.

Sepals 2 - 5, persistent. Petals 2 - 5, hypogynous. Stamens as many, rarely twice as many, as the petals. Styles, or sessile capitate stigmas, 2 - 5. Pod 2 - 5-celled, several - many-seeded, 2 - 5-valved; the partitions left attached to the axis, or evanescent. Seeds cylindrical, straightish or curved. (A Greek name for some obscure herb.)

1. **E. Americàna,** Arnott. Dwarf (1′ high), creeping, rooting in the mud, tufted; leaves obovate; flowers sessile; sepals, petals, stamens, and stigmas 2, rarely 3; seeds 5 or 6 in each cell, rising from the base. (Peplis Americana, *Pursh*. Crypta minima, *Nutt.*) — Margin of ponds, &c., N. Hampshire, to Kentucky. Pod very thin and delicate; the seeds large in proportion, straightish.

ORDER 21. CARYOPHYLLÀCEÆ. (PINK FAMILY.)

Herbs, with opposite entire leaves, symmetrical 4 - 5*-merous flowers, with or without petals; the distinct stamens no more than twice the number of the sepals, either hypogynous or perigynous; styles* 2 - 5*; seeds attached to the* *base or the central column of the 1-celled (rarely 3–5-celled) pod, with a slender embryo coiled or curved around the outside of mealy albumen.*— Bland herbs; the stems usually swollen at the joints; uppermost leaves rarely alternate. Leaves often united at the base. Calyx imbricated in the bud, persistent. Styles stigmatic along the inside. Seeds amphitropous or campylotropous. — There are several suborders, of which the first three are the principal.

Synopsis.

SUBORDER I. SILENEÆ. THE PROPER PINK FAMILY.

Sepals united into a tubular calyx. Petals and stamens borne on the stalk of the many-seeded pod, the former with long claws included in the calyx-tube, mostly convolute in æstivation. Seeds numerous.— Stipules none. Flowers mostly showy.

* Calyx with scaly bractlets at the base. Seeds flattened: embryo nearly straight.

1. **DIANTHUS.** Calyx terete, mostly cylindrical. Styles 2.

* * Calyx naked. Seeds globular or kidney-shaped: embryo curved or coiled.

2. **SAPONARIA.** Calyx terete. Styles 2.
3. **VACCARIA.** Calyx 5-angled and in fruit 5-winged. Styles 2.
4. **SILENE.** Calyx 5-toothed. Styles 3, rarely 4.
5. **AGROSTEMMA.** Calyx with 5 narrow leafy lobes. Styles 5.

SUBORDER II. ALSINEÆ. THE CHICKWEED FAMILY.

Sepals distinct or nearly so. Petals without claws (sometimes none), mostly imbricated in æstivation, and with the stamens inserted at the base of the sessile ovary, or into a little disk which often coheres with the base of the calyx. Pod splitting into valves, few–many-seeded. Stamens opposite the sepals, when not more numerous than they.—Low herbs. Stipules none. .

* Styles opposite the sepals, or, when fewer, opposite those which are exterior in the bud.

+ Valves of the pod as many as the styles (usually 3), and entire.

6. **HONKENYA.** Seeds few, at the base of the pod. Stamens borne on a thick and glandular 10-lobed disk.
7. **ALSINE.** Seeds many, attached to a central column, naked.

+ + Valves or teeth into which the pod splits twice as many as there are styles.

++ Pod splitting to the middle or farther into valves.

8. **ARENARIA.** Petals 5, entire. Styles 3. Pods at first 3-valved, the valves soon 2-cleft, making 6. Seeds rough, naked.
9. **MŒHRINGIA.** Petals 4–5, entire. Styles 2–4. Pods 4–8-valved. Seeds smooth and shining, appendaged at the hilum.
10. **STELLARIA.** Petals 4–5, mostly 2-cleft, sometimes minute or none. Styles (2–5) mostly 3. Pods splitting into twice as many valves. Seeds not appendaged.

++ ++ Pod opening only at the top by teeth.

11. **HOLOSTEUM.** Petals 5, denticulate at the end. Stamens and styles mostly 3.
12. **CERASTIUM.** Petals 4–5, usually 2-cleft. Styles as many as the petals.

* * Styles alternate with the sepals: stamens as many as they, sometimes twice as many.

13. **SAGINA.** Petals 4–5, undivided, or none. Styles 4–5. Pod 4–5-valved.

SUBORDER III. ILLECEBREÆ. THE KNOTWORT FAMILY.

Character same as of the Chickweed Family, but with dry scale-like stipules, the uppermost leaves rarely alternate, and the 1-celled pods sometimes 1-seeded.

* Pod (capsule) many-seeded. Styles 3-5. Petals usually conspicuous.

14. SPERGULARIA. Styles 3-5. Leaves opposite.
15. SPERGULA. Styles 5. Valves of the pod opposite the sepals. Leaves whorled.

* * Pod (utricle) 1-seeded. Styles 2, often united. Petals bristle-form or none. Stamens plainly inserted on the base of the calyx.

16. ANYCHIA. Petals none. Sepals flattish, unarmed.
17. PARONYCHIA. Petals minute or bristle-form. Sepals concave, awned.

SUBORDER IV. SCLERANTHEÆ. THE KNAWEL FAMILY.

Characters of the preceding, but no stipules, and the sepals more united below into an indurated tube surrounding the utricle; the stamens inserted at the throat.

18. SCLERANTHUS. Petals none. Stamens 5 or 10.

SUBORDER V. MOLLUGINEÆ. INDIAN-CHICKWEED FAMILY.

Stamens alternate with the sepals when of the same number, when fewer alternate with the cells of the 3-celled ovary:—otherwise as in Suborders 2 and 3.

19. MOLLUGO. Petals none. Stamens 3-5. Stigmas 3. Pod 3-celled, many-seeded.

SUBORDER I. SILÈNEÆ. THE PROPER PINK FAMILY.

1. DIÁNTHUS, L. PINK. CARNATION.

Calyx cylindrical, 5-toothed, supported at the base by 2 or more imbricated bractlets. Stamens 10. Styles 2. Pod long-stalked, 1-celled, 4-valved at the apex. Seeds flattish: embryo scarcely curved.—Ornamental plants, of well-known aspect and value in cultivation, none natives of this country. (Name from Διός, *of Jupiter*, and ἄνθος, *flower*, i. e. Jove's own flower.)

1. **D. ARMÈRIA**, L. (DEPTFORD PINK.) Flowers in close clusters; bractlets of the calyx and bracts lance-awl-form, downy, as long as the tube; leaves linear, hairy; flowers small, scentless, rose-color with white dots, crenate. ① —Fields, &c., Pennsylvania and E. Massachusetts. July.—(Adv. from Eu.)

D. CARYOPHÝLLUS, L., is the original of the CLOVE-PINK or CARNATION, &c. of the gardens. D. BARBÀTUS is the SWEET-WILLIAM or BUNCH PINK.

2. SAPONÀRIA, L. SOAPWORT.

Calyx tubular, terete and even, 5-toothed, naked at the base. Stamens 10. Styles 2. Pod short-stalked, 1-celled, or partly 2-celled at the base, 4-toothed at the apex. Embryo coiled into a ring.—Flowers cymose-clustered. (Name from *sapo*, soap, the mucilaginous juice of the common species forming a lather with water.)

1. **S.** OFFICINÀLIS, L. (COMMON SOAPWORT. BOUNCING BET.) Clusters corymbed; calyx cylindrical, slightly downy; petals crowned with an appendage at the top of the claw; leaves oval-lanceolate. ♃ — Road-sides, &c. July - Sept. — A stout plant with large rose-colored flowers, which are commonly double. (Adv. from Eu.)

3. VACCÀRIA, Medik. COW-HERB.

Calyx naked at the base, ovoid-pyramidal, 5-angled, 5-toothed, enlarged and wing-angled in fruit. Petals not crowned. Stamens 10. Styles 2. Pod incompletely 4-celled at the base. — A smooth annual herb, with pale red flowers in corymbed cymes, and ovate-lanceolate leaves. (Name from *Vacca*, a cow.)

1. V. VULGÀRIS, Host. (Saponaria Vaccaria, *L.*) — Escaped from gardens and becoming spontaneous in some places. (Adv. from Eu.)

4. SILÈNE, L. CATCHFLY. CAMPION.

Calyx tubular, 5-toothed, naked at the base. Stamens 10. Styles 3, rarely 4. Pod 1-celled, or partly 3-celled at the base, opening by 6 teeth at the apex. Embryo coiled. — Flowers solitary or in clustered cymes. Petals mostly crowned with a scale at the base of the blade. (Name from *σίαλον*, *saliva*, in allusion to the viscid secretion on the stems and calyx of many species. The English name *Catchfly* alludes to the same peculiarity.)

* *Calyx bladdery-inflated: perennial: flowers panicled, white.*

1. **S. stellàta,** Ait. (STARRY CAMPION.) *Leaves in whorls of* 4, *ovate-lanceolate*, taper-pointed; calyx bell-shaped; *petals cut into a fringe, crownless.* — Wooded banks, Rhode Island to Wisconsin, Kentucky, and southward. July. — Stem 3° high, minutely pubescent, with a large and open pyramidal panicle. Corolla ¾′ broad. (Cucùbalus stellatus, *L.*)

2. **S. nívea,** DC. *Leaves opposite, lanceolate or oblong*, taper-pointed; calyx oblong; *petals wedge-form, 2-cleft, minutely crowned.* — Columbia, Pennsylvania, to Ohio and Illinois: rare. July. — Stem 1° - 2° high, almost smooth. Flowers few, larger than in No. 1.

3. **S.** INFLÀTA, Smith. (BLADDER CAMPION.) *Glaucous; leaves opposite, ovate-lanceolate; calyx globular, much inflated*, elegantly veined; petals 2-cleft, nearly crownless. — Fields and road-sides, E. New England. July. — A foot high. Flowers loosely cymose. (Nat. from Eu.)

* * *Calyx elongated or club-shaped, not inflated except by the enlarging pod: flowers cymose or clustered: perennial, pubescent with viscid hairs, especially the calyx: petals crowned, red or rose-color.*

4. **S. Pennsylvánica,** Michx. (WILD PINK.) Stems low (4′ - 8′ high); root-leaves narrowly spatulate, nearly glabrous, tapering into hairy petioles; *stem-leaves* (2 - 3 pairs) *lanceolate; flowers clustered*, short-stalked; calyx club-shaped; *petals wedge-form, slightly notched and eroded at the end, purple rose-*

color. — Rocky or gravelly places, Eastern New-England to Pennsylvania, Kentucky, and southward. April – June.

5. **S. Virginica,** L. (FIRE PINK. CATCHFLY.) Stems slender (1° – 2° high); *leaves thin, spatulate, or the upper oblong-lanceolate; flowers few and loosely cymose,* peduncled; calyx oblong-cylindrical, soon obconical; *petals oblong, 2-cleft, deep crimson;* the limb 1′ long. — Open woods, W. New York (*Sartwell*) to Illinois and southward. June – Aug.

6. **S. règia,** Sims. (ROYAL CATCHFLY.) Stem roughish, erect (3° – 4° high); *leaves thickish, ovate-lanceolate,* acute; *flowers numerous, short-stalked,* in clusters, forming a strict panicle; calyx ovoid-club-shaped in fruit; *petals spatulate-lanceolate, mostly undivided, deep scarlet.* — Prairies, Ohio, Kentucky, and southward. July.

7. **S. rotundifòlia,** Nutt. (ROUND-LEAVED CATCHFLY.) Viscid-hairy; stems weak, branched, decumbent (2° long); *leaves thin, round, abruptly pointed,* the lower obovate; flowers few and loosely cymose, stalked; calyx elongated; *petals 2-cleft and cut-toothed, deep scarlet.* — Shaded banks of the Ohio, and in Kentucky. June – Aug. — Leaves and flowers large. This and No. 6 may pass into No. 5.

* * * *Calyx not inflated, except by the enlarging pod: annual: flowers rose, flesh-color, or white, opening only at night or in cloudy weather* (*except No.* 8).

+ *Glabrous throughout: a portion of each joint of the stem mostly glutinous.*

8. **S.** ARMÈRIA, L. (SWEET-WILLIAM CATCHFLY.) Glaucous; *leaves ovate-lanceolate;* flowers cymose-clustered; *calyx club-shaped,* purplish, as well as the petals, which are notched, and crowned with awl-shaped scales. — Escaped from gardens to waste places; rare. (Adv. from Eu.)

9. **S. antirrhìna,** L. (SLEEPY CATCHFLY.) Stem slender (8′ – 30′ high); *leaves lanceolate* or linear; flowers small, paniculate; *calyx ovoid;* petals obovate, minutely crowned, inconspicuous, rarely seen expanded. — Dry soil; common in waste places. June – Sept.

+ + *Viscid-pubescent: flowers white or nearly so, sweet-scented at night.*

10. **S.** NOCTÚRNA, L. (NIGHT-CATCHFLY.) Leaves short, the lower spatulate, the upper linear; *flowers small, alternate in a strict* 1*-sided spike;* petals 2-parted. — Introduced sparingly in Pennsylvania, according to *Schweinitz.* (Adv. from Eu.)

11. **S.** NOCTIFLÒRA, L. (NIGHT-FLOWERING CATCHFLY.) *Viscid-hairy,* tall (1° – 3° high); lower leaves large and spatulate; the upper lanceolate, taper-pointed; *flowers solitary in the forks, peduncled;* calyx cylindrical with long awl-shaped teeth; petals rather large, 2-parted, crowned. (S. nocturna, *Bigelow.*) — Cultivated grounds. (Nat. from Eu.)

* * * * *Dwarf, tufted, smooth: perennial,* 1*-flowered.*

12. **S. acaùlis,** L. (MOSS CAMPION.) Tufted like a moss (1′ – 2′ high), leaves linear, crowded to the summit of the short stems; flowers almost sessile; calyx slightly inflated; petals purple or rarely white, inversely heart-shaped, crowned. — Alpine summits of the White Mountains, New Hampshire. July. (Eu.)

5. AGROSTÉMMA, L. CORN-COCKLE.

Calyx naked, tubular, coriaceous, its limb of 5 long and linear foliaceous teeth or lobes, longer than the corolla, which fall off in fruiting. Petals not crowned, entire. Stamens 10, those opposite the petals adhering to the base of their claws. Styles 5, alternate with the calyx-teeth. Pod 1-celled, opening at the top by 5 teeth. Embryo coiled. — Annual or biennial, erect and branching, pubescent, with long linear leaves, and large purple flowers on long peduncles. (Name ἀγροῦ στέμμα, *crown of the field*, being a handsome corn-weed.)

1. A. GITHÀGO, L. (Lychnis Githago, *Lam.*) Wheat-fields; too common; the black seeds of Cockle being injurious to the appearance of the flour. (Adv. from Eu.)

LÝCHNIS, Tourn., to which the Cockle was once referred, is represented in our gardens by L. CORONÀRIA, the MULLEIN PINK; L. CHALCEDÓNICA, the SCARLET LYCHNIS; and L. FLOS-CÙCULI, the RAGGED ROBIN.

SUBORDER II. ALSÍNEÆ. THE CHICKWEED FAMILY.

6. HONKÉNYA, Ehrhart. SEA-SANDWORT.

Sepals 5, fleshy. Disk at the base of the ovary conspicuous and glandular, 10-notched. Petals 5, obòvate-wedge-shaped, tapering into a short claw. Stamens 10, inserted on the edge of the disk. Styles 3 – 5, short, opposite as many of the sepals. Ovary more or less 3 – 5-celled. Pod fleshy, opening by as many valves as styles, few-seeded at the base. Seeds smooth, short-beaked next the naked hilum. A very fleshy maritime perennial, forked, with ovate or oblong leaves, and solitary axillary flowers, more or less polygamo-diœcious. Petals white. (Named in honor of *Honckeny*, a German botanist.)

1. **H. peploides,** Ehrhart. (Arenaria peploides, *L.*) — Sea-beach, Maine to New Jersey. May, June. — Grows in large tufts in the sands, 6′ – 10′ high. Leaves ¾′ long, partly clasping, very thick. (Eu.)

7. ALSÌNE, (Tourn.) Wahl. GROVE SANDWORT.

Sepals 5. Petals 5, entire, or rarely notched at the apex. Stamens 10, inserted on a small disk. Styles 3. Ovary 1-celled. Pod many-seeded, 3-valved to the base; the valves entire, opposite the inner sepals. Seeds usually rough, naked at the hilum. — Small tufted herbs, with narrow leaves, and mostly white flowers, which are solitary and terminal or cymose. (Name from ἄλσος, *a grove.*) — This and No. 9 are comprised in Arenaria by many botanists.

* *Leaves rigid, awl-shaped or bristle-shaped.*

1. **A. squarròsa,** Fenzl. (PINE-BARREN SANDWORT.) Densely tufted from a deep perpendicular root; *leaves closely imbricated*, but spreading, *awl-shaped, short, channelled;* branches naked and minutely glandular above, several-flowered; *sepals obtuse*, ovate, shorter than the pod. ♃ (Arenaria squarrosa, *Michx.*) — In pure sand, Long Island, New Jersey, and southward along the coast. May – July.

2. **A. Michaúxii,** Fenzl. Erect, or usually diffusely spreading from a small root, smooth; *leaves slender, between awl-shaped and bristle-form,* with many others *clustered* in the axils; cyme diffuse, naked, many-flowered; *sepals pointed, 3-ribbed,* ovate, as long as the pod. ♃ (Arenaria stricta, *Michx.*) — Rocks and dry wooded banks, Vermont to Wisconsin and Kentucky. July.

* * *Leaves soft and herbaceous, filiform-linear: petals retuse or notched.*

3. **A. pátula.** Diffusely branched from the slender root; stems filiform (6′–10′ long); branches of the cyme diverging; peduncles long; *sepals lanceolate, acuminate, 3-nerved,* petals spatulate, emarginate. (Arenaria patula, *Michx.*) — Cliffs of Kentucky River, and mountains of Western Virginia. July. — Smoothish: leaves ½′–1′ long.

4. **A. Grœnlándica,** Fenzl. (MOUNTAIN SANDWORT.) Densely tufted from slender roots, smooth; stems filiform, erect (2′–4′ high), few-flowered; *sepals oblong, obtuse, nerveless;* petals obovate, somewhat notched. ♃ (Stellaria Grœnlandica, *Retz.* Arenaria Grœnlandica, *Spreng.*) — Summit of the Shawangunk, Catskill, and Adirondack Mountains, New York, and of all the higher mountains of New England, and northward; alpine or subalpine. At Bath, Maine, on river-banks near the sea. June – Aug. — Leaves and peduncles 3″–6″ long; flowers large in proportion.

A. GLÀBRA, of the mountain-tops in Carolina, may occur on those of Virginia.

8. ARENÀRIA, L. SANDWORT.

Sepals 5. Petals 5, entire, rarely wanting. Stamens 10. Styles 3, rarely 2 or 4. Ovary 1-celled. Pod many-seeded, opening above by as many valves as there are styles, each valve soon splitting into two. Seeds naked at the hilum. (Name from *arena,* sand, in which many of the species love to grow.)

1. **A. SERPYLLIFÒLIA,** L. (THYME-LEAVED SANDWORT.) Diffusely branched, roughish (2′–6′ high); leaves ovate, acute (small); sepals lanceolate, pointed, 3–5-nerved, about as long as the petals and the 6-toothed pod. ① — Sandy waste places. June – Aug. (Nat. from Eu.)

A. DIFFÙSA, Ell., will probably be found in Southern Virginia.

9. MŒHRINGÌA, L. MŒHRINGIA.

Seeds *strophiolate,* i. e. with a thickish appendage at the hilum, smooth. Young ovary 3-celled. Otherwise nearly as in Arenaria. — Flaccid herbs; the parts of the flower sometimes in fours. (Named for *Mœhring,* a German botanist.)

1. **M. lateriflòra,** L. Sparingly branched, erect, minutely pubescent; leaves oval or oblong, obtuse; peduncles 2- (rarely 3–4-) flowered, becoming lateral; sepals oblong, obtuse, shorter than the petals. ♃ (Arenaria lateriflora, *L.*) — Shady gravelly banks along streams, New England to Wisconsin, northward. May, June. — Leaves ½′ to 1′ long: corolla ½′ broad, white. (Eu.)

10. STELLÀRIA, L. CHICKWEED. STARWORT.

Sepals 4–5. Petals 4–5, deeply 2-cleft, sometimes none. Stamens 8, 10, or fewer. Styles 3–4, rarely 5, opposite as many sepals. Ovary 1-celled. Pod ovoid, opening by twice as many valves as styles, several-many-seeded. Seeds naked. — Flowers (white) terminal, or appearing lateral by the prolongation of the stem from the upper axils. (Name from *stella*, a star, in allusion to the star-shaped flowers.)

* *Stamens usually fewer than* 10 : *leaves broad.*

1. **S. mèdia**, Smith. (Common Chickweed.) Stems spreading, marked with an alternate pubescent line; *leaves ovate, the lower on hairy petioles; petals 2-parted, shorter than the calyx;* stamens 3 – 10. ① ② — Fields and around dwellings, everywhere. (Nat. from Eu.)

2. **S. pùbera**, Michx. (Great Chickweed.) Stems spreading, marked with 2 opposite hairy lines; *leaves all sessile,* oblong or ovate (2′ long). *petals deeply 2-cleft, longer than the calyx.* ♃ — Shaded rocks, Penn. to Kentucky, and southward. May.

* * *Stamens mostly* 10 : *manifestly perigynous : perennial : leaves narrow, sessile : plants glabrous throughout.*

+ *Scaly-bracted : petals* 2-*parted, equalling or surpassing the calyx.*

3. **S. longifòlia**, Muhl. (Stitchwort.) Stem branching above; weak, often with rough angles (8′ – 18′ high); *leaves linear, acutish at both ends, spreading; cymes naked and at length lateral, peduncled,* many-flowered, the slender *pedicels spreading;* petals 2-parted, soon longer than the calyx; seeds smooth. — Grassy places, common, especially northward. June, July. (Eu.)

4. **S. lóngipes**, Goldie. (Long-stalked Stitchwort.) Shining or somewhat glaucous, very smooth; *leaves ascending, lanceolate or linear-lanceolate, acute, broadest at the base,* rather rigid; cyme terminal, few-flowered, the long *pedicels strictly erect;* petals longer than the calyx; seeds smooth. — Maine to Wisconsin, rare: common farther north. (Eu.)

5. **S. uliginòsa**, Murr. (Swamp Stitchwort.) Stems weak, decumbent or diffuse, at length prolonged, leaving the naked and usually *sessile cymes lateral; leaves lanceolate or oblong,* veiny; petals and ripe *pods as long as the calyx; seeds roughened.* (S. aquatica, *Pollich, &c.*) — Swamps and rills, Philadelphia and Westchester, Pennsylvania (*Darlington,* &c.); and northward in British America. (Eu.)

+ + *Leafy-bracted, the flowers in the forks of the stem or of leafy branches, even the latest with foliaceous bracts; petals 2-parted, small, or often none; styles* 3 – 4 : *pod longer than the calyx.*

6. **S. crassifòlia**, Ehrhart. Stems diffuse or erect, flaccid; *leaves rather fleshy,* varying from linear-lanceolate to oblong; *petals longer than the calyx,* or wanting; *seeds rugose-roughened.* — An apetalous 4 – 6-androus state is Sagina fontinalis, *Short & Peter.* Cliffs of Kentucky River and Elkhorn Creek, forming broad mats in springy places, *Short.* April, May. — Also in British America. (Eu.)

7. **S. boreàlis**, Bigelow. (Northern Stitchwort.) Stems erect or spreading, flaccid, many times forked, at length resolved into a leafy cyme; leaves varying from broadly lanceolate to ovate-oblong; *petals* 2 – 5, *shorter than the calyx, or oftener none;* sepals acute; styles usually 4; *seeds smooth.* — Shaded

swamps, &c., Rhode Island to Wisconsin northward, and north to the arctic regions. June – Aug. (Eu.)

11. HOLÓSTEUM, L. Jagged Chickweed.

Sepals 5. Petals 5, usually jagged or denticulate at the point. Stamens 3 – 5, rarely 10. Styles 3. Pod ovoid, 1-celled, many-seeded, opening at the top by 6 teeth. Seeds rough. — Annuals or biennials, with several (white) flowers in an umbel, borne on a long terminal peduncle. (Name composed of ὅλος, *all*, and ὀστέον, *bone*, by antiphrasis, these plants being soft and tender.)

1. **H. umbellàtum**, L. Leaves oblong; peduncle and upper part of the stem glandular-pubescent; pedicels reflexed after flowering. — Hills around Lancaster, Pennsylvania, abundant, *Prof. Porter*. (Adv. from Eu.)

12. CERÁSTIUM, L. Mouse-ear Chickweed.

Sepals 5, rarely 4. Petals as many, 2-lobed or cleft, rarely entire. Stamens twice as many, or fewer. Styles equal in number to the sepals, and opposite them. Pod 1-celled, usually elongated, membranaceous, opening at the apex by twice as many teeth as there were styles, many-seeded. Seeds rough. — Flowers white, in terminal cymes. (Name from κέρας, *a horn*, alluding to the shape of the pods in many species.)

§ 1. *Petals 2-cleft or obcordate: parts of the flower in fives: pods (except in No. 5) longer than the calyx, and usually more or less curved.*

* *Petals not longer than the calyx, but often shorter, sometimes altogether wanting: stamens occasionally only* 5.

1. **C. vulgàtum**, L. (Mouse-ear Chickweed.) Very hairy and rather clammy, nearly erect (4′ – 9′ high); *leaves ovate or obovate;* bracts herbaceous; flowers (small) in very close clusters at first; *pedicels even in fruit not longer than the acute sepals.* ① ② — Grassy banks. May – July. — The names of this and the next were transposed by Linnæus himself, and have consequently been differently applied by different authors ever since. This is the C. vulgatum of English botanists, and of the Linnæan herbarium: but the next is so called in Sweden and on the Continent generally. (Nat. from Eu.)

2. **C. viscòsum**, L. (Larger Mouse-ear Chickweed.) Stems clammy-hairy, spreading (6′ – 15′ long); *leaves oblong*, greener; upper bracts scarious-margined; flowers at first clustered; *pedicels longer than the obtuse sepals*, the earlier ones in fruit much longer. ② ♃ — Grassy fields and copses. May – July. — A larger and coarser plant than No. 1, the flowers larger. (Nat. from Eu.)

* * *Petals longer than the calyx.*

3. **C. nùtans**, Raf. Clammy-pubescent; stems erect, slender, grooved, diffusely branched (6′ – 20′ high); cyme loose and open, *many-flowered; leaves oblong-lanceolate*, acute, the lowest spatulate; peduncles mostly elongated; petals longer than the calyx; *pods nodding on the stalks, curved upwards, thrice the length of the calyx.* ① ② — Moist places, Vermont to Kentucky and southward. May – July.

4. **C. oblongifòlium,** Torr. Stems ascending, villous (6 – 12′ high), *many-flowered; leaves oblong-lanceolate* and ovate; peduncles clammy-hairy; petals (2-lobed) and ripe *pods about twice the length of the calyx.* ♃ — Rocky places, New York and Pennsylvania; rare. May. — Stouter and larger-flowered than the following species.

5. **C. arvénse,** L. (FIELD CHICKWEED.) Stems ascending or erect, tufted, downy, slender (4′ – 8′ high), naked and *few-flowered* at the summit; *leaves linear;* petals obcordate, more than twice the length of the calyx; *pods scarcely longer than the calyx.* ♃ — Dry or rocky places, Northeastern States, and northward, where it is indigenous. May, June. (Eu.)

§ 2. MŒNCHIA, Ehrhart. — *Petals entire or merely retuse: parts of the flower commonly in fours: pod ovate, not longer than the calyx.*

6. **C.** QUATERNÉLLUM, Fenzl. Smooth and glaucous; stem simple, erect (2′ – 4′ high), 1 – 2-flowered; leaves lanceolate, acute; petals not exceeding the calyx; stamens 4. ① (Sagina erecta, *L.* Mœnchia quaternella, *Ehrhart M.* erecta, *Smith.*) — Near Baltimore, in dry ground. (Adv. from Eu.)

13. SAGÌNA, L. PEARLWORT.

Sepals 4 or 5. Petals 4 or 5, undivided, often obsolete or none. Stamens as many as the sepals, rarely twice their number. Styles as many as the sepals and alternate with them. Pod many-seeded, 4 – 5-valved; the valves opposite the sepals. Seeds smooth. — Little, matted herbs, with thread-like or awl-shaped leaves, and small flowers. (Name from *sagina*, fattening; of no obvious application to these minute weeds.)

* *Parts of the flower all in fours, or sometimes in fives.*

1. **S. procúmbens,** L. Perennial, depressed; *leaves thread-form or narrowly linear;* peduncles ascending in fruit; stamens 4 – 5; *petals shorter than the broadly ovate sepals,* sometimes none. — Springy places, Maine to Pennsylvania. May – Aug. (Eu.)

2. **S.** APÉTALA, L. Annual, erect; *leaves almost bristle-form;* stamens 4; *petals obsolete or none.* — Sandy fields, New York to Penn.; rare. (Adv. from Eu.)

* * *Sepals, petals, styles, and valves* 5: *stamens* 10.

3. **S. nodòsa,** Fenzl. Perennial, tufted; stems ascending (3′ – 5′ high), branching; leaves thread-form, the upper short and awl-shaped, with minute ones fascicled in their axils so that the branchlets appear knotty; *petals much longer than the calyx.* (Spergula nodosa, *L.*) — Wet sandy soil, Isle of Shoals, N. Hampshire (*Oakes & Robbins*), shore of Lake Superior, and northward. July. (Eu.)

S. ELLIÓTTII, Fenzl (Spergula decumbens, *Ell.*) may occur in S. Virginia.

SUBORDER III. ILLECÈBREÆ. THE KNOTWORT FAMILY.

14. SPERGULÀRIA, Pers. SPURREY-SANDWORT.

Sepals 5. Petals 5, entire. Stamens 2 – 10. Styles and valves of the many-seeded pod 3 – 5, when 5 the valves alternate with the sepals! Embryo not coiled into a complete ring. — Low herbs, growing on or near the sea-coast, with fleshy opposite leaves, and smaller ones often clustered in the axils: stipules scaly-membranaceous. (Name altered from *Spergula*.)

1. **S. rùbra,** Pers. Much branched, upright or spreading, smooth or viscid-pubescent; leaves filiform-linear, rather fleshy; petals purple-rose-color; seeds marginless. ① (Arenaria rubra, *L.*) — Sandy soil, often considerably remote from salt water, Maine to Virginia and southward. June - Sept. — Leaves mostly shorter than the joints. Flowers about 2″ broad. (Eu.)

Var. **marìna.** Larger; the leaves longer and more fleshy; flowers 2 - 4 times larger; pods equalling or exceeding the calyx; seeds marginless (Arenaria rubra, var. marina, *L.*), or wing-margined (A. media, *L.*). ① ♃? — Sea-coast; common. (Eu.)

15. SPÉRGULA, L. SPURREY.

Stamens 5 or 10. Styles 5. The 5 valves of the pod opposite the sepals. Embryo spirally annular. Leaves in whorls. Otherwise as in Spergularia. (Name from *spargo*, to scatter, from the seeds.)

1. **S.** ARVÉNSIS, L. (CORN SPURREY.) Leaves numerous in the whorls, linear-thread-shaped (1′ - 2′ long); stipules minute; flowers white, in a stalked panicled cyme; seeds rough, with a narrow and sharp edge. ① — Grain-fields, &c. (Adv. from Eu.)

16. ANÝCHIA, Michx. FORKED CHICKWEED.

Sepals 5, scarcely concave, indistinctly mucronate on the back, greenish. Petals none. Stamens 2 - 3, rarely 5. Stigmas 2, sessile. Utricle 1-seeded, larger than the calyx. Radicle turned downwards. — Small, many times forked annuals, with small stipules and minute flowers in the forks. (Same derivation as the next genus.)

1. **A. dichótoma,** Michx. Erect or spreading; leaves varying from lanceolate to elliptical, somewhat petioled. Varies much; in woods or rich soil being very smooth, erect (6′ - 10′ high) and capillary, with long joints, the leaves broader and thinner (5″ - 10″ long), and the flowers more stalked (A. capillacea, *Nutt.*, & Queria Canadensis, *L.*): in sterile or parched soil it is somewhat pubescent, low and spreading, short-jointed, narrower-leaved, and the flowers nearly sessile and more clustered (A. dichotoma, *DC.*). — Common throughout. June - Aug.

17. PARONÝCHIA, Tourn. WHITLOW-WORT.

Sepals 5, linear or oblong concave, awned at the apex. Petals bristle-form, or minute teeth, or none. Stamens 5. Style 2-cleft at the apex. Utricle 1-seeded, enclosed in the calyx. Radicle ascending. — Tufted herbs, with dry and silvery stipules, and clustered flowers. (A Greek name for a *whitlow*, and for a plant thought to cure it.)

1. **P. argyrócoma,** Nutt. (SILVER CHICKWEED.) Densely matted, much branched, *spreading; leaves linear; flowers capitate, clustered,* surrounded

by conspicuous *large silvery bracts;* calyx hairy, short-awned; petals mere teeth between the stamens. ♃ — Slides in the Notch of the White Mountains, New Hampshire, and bare summits above: a recent discovery. Alleghany Mountains from Virginia southward. July.

2. **P. dichótoma,** Nutt. Smooth, tufted; stems (6′ – 12′ high) *ascending* from a rather woody base; *leaves and bracts awl-shaped; cymes open, many-times forked;* sepals short-pointed; minute bristles in place of petals. ♃ — Rocks, Harper's Ferry, Virginia, and southwestward. July – Sept.

SUBORDER IV. SCLERÁNTHEÆ. THE KNAWEL FAMILY.

18. SCLERÁNTHUS, L. KNAWEL.

Sepals 5, united below in an indurated cup, enclosing the 1-seeded utricle. Petals none. Stamens 10 or 5. Styles 2, distinct. — Homely little weeds, with awl-shaped leaves, obscure greenish clustered flowers, and no stipules. (Name from σκληρός, *hard,* and ἄνθος, *flower,* from the hardened calyx-tube.)

1. **S. ANNUUS,** L. Much branched and spreading (3′ – 5′ high); flowers sessile in the forks; calyx-lobes scarcely margined. ① — Sandy waste places. (Nat. from Eu.)

SUBORDER V. MOLLUGÍNEÆ. INDIAN-CHICKWEED FAMILY.

19. MOLLÙGO, L. INDIAN-CHICKWEED.

Sepals 5, white inside. Petals none. Stamens hypogynous, 5 and alternate with the sepals, or 3 and alternate with the 3 cells of the ovary. Stigmas 3. Pod 3-celled, 3-valved, loculicidal, the partitions breaking away from the many-seeded axis. — Low homely annuals, much branched; the stipules obsolete. (An old Latin name for some soft plant.)

1. **M. verticillàta,** L. (CARPET-WEED.) Prostrate, forming patches; leaves spatulate, clustered in whorls at the joints, where the 1-flowered pedicels form a sort of sessile umbel; stamens usually 3. — Sandy river-banks, and cultivated grounds. June – Sept. (An immigrant from farther south.)

ORDER 22. PORTULACÀCEÆ. (PURSLANE FAMILY.)

Herbs, with succulent leaves, and regular but unsymmetrical flowers; viz., *sepals usually fewer than the petals; the stamens opposite the petals when of the same number, but often indefinite: otherwise nearly as* Chickweeds. — Sepals 2, rarely 3 or 5. Petals 5, or sometimes none. Stamens mostly 5 – 20. Styles 3 – 8, united below, or distinct, stigmatic along the inside. Pod 1 – 5-celled, with few or many campylotropous seeds rising on slender stalks from the base, or from a central placenta. Embryo curved around mealy albumen. — Insipid and innocent herbs, with opposite or alternate entire leaves. Corolla opening only in sunshine, mostly ephemeral, then shrivelling.

Synopsis.

* Sepals 5. Petals none. Pod 3–5-celled, opening by a lid.

1. **SESUVIUM.** Stamens 5 – 60, inserted on the free calyx.

* * Sepals 2. Petals 5. Pod 1-celled.

2. **PORTULACA.** Stamens 7 - 20, on the partly adherent calyx. Pod opening by a lid.
3. **TALINUM.** Stamens more numerous than the petals, hypogynous. Pod many-seeded.
4. **CLAYTONIA.** Stamens as many as the hypogynous petals, and attached to their base. Pod 3 - 6-seeded.

1. SESÙVIUM, L. SEA PURSLANE.

Calyx 5-parted, purplish inside, persistent, free. Petals none. Stamens 5 – 60, inserted on the calyx. Styles 3 – 5, separate. Pod 3 - 5-celled, many-seeded, opening transversely (circumscissile), the upper part falling off as a lid. — Prostrate maritime herbs, with succulent stems and (opposite) leaves, and axillary or terminal flowers. (An unexplained name.)

1. **S. Portulacástrum,** L. Leaves lanceolate-oblong, flattish; flowers sessile or short-peduncled; stamens many. ♃ — Coast of New Jersey and southward. July - Sept.

2. PORTULÀCA, Tourn. PURSLANE.

Calyx 2-cleft; the tube cohering with the ovary below. Petals 5, rarely 6, with the 7 – 20 stamens inserted on the calyx, fugacious. Style mostly 3 – 8-parted. Pod 1-celled, globular, many-seeded, opening transversely, the upper part (with the upper part of the calyx) separating like a lid. — Fleshy annuals, with scattered leaves. (An old Latin name, of unknown meaning.)

1. P. OLERÀCEA, L. (COMMON PURSLANE.) Prostrate, very smooth; leaves obovate or wedge-form; flowers sessile (opening only in sunny mornings); sepals keeled; petals pale yellow; stamens 7 – 12; style deeply 5 – 6-parted; flower-bud flat and acute. — Cultivated and waste grounds; common. (Nat. from Eu.)

P. RETÙSA, Engelm., too closely resembling the common Purslane, is indigenous west of the Mississippi.

P. GILLIÈSII, P. GRANDIFLÒRA, &c. are species, or varieties, with terete leaves, hairy axils, and showy red or purple flowers, cultivated in gardens for ornament.

3. TALÌNUM, Adans. TALINUM.

Sepals 2, distinct and free, deciduous. Petals 5, ephemeral. Stamens 10 – 30. Style 3-lobed at the apex. Pod 3-celled at the base when young, longitudinally 3-valved, with many seeds on a globular stalked placenta. (Derivation of the name obscure.)

1. **T. teretifòlium,** Pursh. Leafy stems low, tuberous at the base; leaves linear, cylindrical; peduncle long and naked, bearing an open cyme of purple flowers (¾′ broad); stamens 15 – 20. ♃ — Serpentine rocks, Westchester, Pennsylvania, Falls of St. Croix River, Wisconsin, and southward. June – Aug. — Peduncles 3′ - 6′ long.

4. CLAYTÒNIA, L. SPRING-BEAUTY.

Sepals 2, ovate, free, green and persistent. Stamens 5, adhering to the short claws of the petals. Style 3-lobed at the apex. Pod 1-celled, 3-valved, 3–6-seeded.—Our two species are perennials, sending up simple stems in early spring from a small deep tuber, bearing a pair of opposite leaves, and a loose raceme of pretty flowers. Corolla pale rose-color with deeper veins, opening for more than one day! (Named in honor of *Clayton*, one of the earliest botanists of this country, who contributed to Gronovius the materials for the Flora Virginica.)

1. **C. Virgínica,** L. Leaves linear-lanceolate, elongated (3′–6′ long).—Moist open woods; common, especially westward and southward.

2. **C. Caroliniàna,** Michx. Leaves spatulate-oblong or oval-lanceolate (1′–2′ long).—Vermont to Ohio, and southward along the Alleghanies.

ORDER 23. MALVÀCEÆ. (MALLOW FAMILY.)

Herbs or shrubs, with alternate stipulate leaves and regular flowers, the calyx valvate and the corolla convolute in the bud, numerous stamens monadelphous in a column, which is united at the base with the short claws of the petals, 1*-celled anthers, and kidney-shaped seeds.*—Sepals 5, united at the base, persistent, often involucellate with a whorl of bractlets outside, forming a sort of exterior calyx. Petals 5. Anthers kidney-shaped, opening along the top. Pistils several, with the ovaries united in a ring, or forming a several-celled pod. Seeds with little albumen: embryo large, curved, the leafy cotyledons variously doubled up.—Mucilaginous, innocent plants, with tough bark, and palmately-veined leaves. Flower stalks with a joint, axillary.

Synopsis.

TRIBE I. **MALVEÆ.** Column of stamens anther-bearing at the top. Ovaries and pods (carpels) 5–20 or more, closely united in a ring around a central axis, from which they separate after ripening.

* Stigmas occupying the inner face of the styles: carpels 1-seeded, falling away separately.

1. ALTHÆA. Involucel of 6 to 9 bractlets.
2. MALVA. Involucel of 3 bractlets. Petals obcordate. Carpels rounded, beakless.
3. CALLIRRHOE. Involucel of 3 bractlets or none. Petals truncate. Carpels beaked.
4. NAPÆA. Involucel none. Flowers diœcious. Stamens few.

* * Stigmas terminal, capitate: carpels 1–few-seeded, opening before they fall away.

5. SIDA. Involucel none. Carpels or cells 1-seeded. Seed pendulous.
6. ABUTILON. Involucel none. Carpels or cells 3–several-seeded.
7. MODIOLA. Involucel of 3 bractlets. Carpels 2-seeded, and with a transverse partition between the seeds.

TRIBE II. **HIBISCEÆ.** Column of stamens anther-bearing for a considerable part of its length, naked and 5-toothed at the very apex. Pod mostly 5-celled, loculicidal, leaving scarcely any axis in the centre after opening.

8. KOSTELETZKYA. Involucel of several bractlets. Pod 5-celled, 5-seeded.
9. HIBISCUS Involucel of many bractlets. Calyx persistent. Pod 5-celled, many-seeded.

1. ALTHÆA, L. MARSH-MALLOW.

Calyx surrounded by a 6–7-cleft involucel. Otherwise as in **Malva**. (Name from *ἄλθω*, *to cure*, in allusion to its healing properties.)

1. **A.** OFFICINÀLIS, L. (COMMON MARSH-MALLOW.) Stem erect; leaves ovate or slightly heart-shaped, toothed, sometimes 3-lobed, velvety-downy: peduncles axillary, many-flowered. ♃ — Salt marshes, coast of New England and New York. Aug., Sept. — Flowers pale rose-color. Root thick, abounding in mucilage, the basis of the *Pâtes de Guimauve*. (Nat. from Eu.)

A. RÒSEA, and A. FICIFÒLIA, are the well-known garden HOLLYHOCKS.

2. MÁLVA, L. MALLOW.

Calyx with a 3-leaved involucel at the base, like an outer calyx. Petals obcordate. Styles numerous, stigmatic down the inner side. Fruit depressed, separating at maturity into as many 1-seeded and indehiscent round kidney-shaped blunt carpels as there are styles. Radicle pointing downwards. (An old Latin name, from *μαλᾶχη*, *soft*, alluding to the emollient leaves.)

1. M. ROTUNDIFÒLIA, L. (COMMON MALLOW.) *Stems short, simple, decumbent* from a deep biennial or perennial root; *leaves* round-heart-shaped, on very long petioles, crenate, *obscurely lobed;* petals twice the length of the calyx, whitish; carpels pubescent, even. — Way-sides and cultivated grounds; common. (Nat. from Eu.)

2. M. SYLVÉSTRIS, L. (HIGH MALLOW.) *Stem erect, branched* (2°–3° high); *leaves rather sharply* 5–7-*lobed;* petals thrice the length of the calyx, large, purple and rose-color; carpels wrinkled-veiny. ♃ — Way-sides. (Adv. from Eu.)

M. CRÍSPA, the CURLED MALLOW, and M. MOSCHÀTA, the MUSK MALLOW, are occasionally spontaneous around gardens.

3. CALLÍRRHOË, Nutt. CALLIRRHOË.

Calyx either naked or with a 3-leaved involucel at its base. Petals wedge-shaped and truncate (usually red-purple). Styles, &c. as in Malva. Carpels 10–20, straightish, with a short empty beak, separated within from the 1-seeded cell by a narrow projection, indehiscent or partly 2-valved. Radicle pointing downwards. — Flowers perfect.

1. **C. triangulàta,** Gray. Hairy-pubescent; stems nearly erect (2° high) from a tuberous root; leaves triangular or halberd-shaped, or the lowest rather heart-shaped, coarsely crenate; the upper incised or 3–5-cleft; flowers panicled, short-pedicelled (purple); *involucel as long as the calyx; carpels short-pointed, crestless*. (Malva triangulata, *Leavenworth*. M. Houghtonii, *Torr. & Gray*.) — Dry prairies, Wisconsin, Illinois, and southward. July.

2. **C. alcæoides,** Gray. Strigose-pubescent; stems slender (1° high); lower leaves triangular-heart-shaped, incised; the upper 5–7-parted, laciniate, the uppermost divided into linear segments; flowers corymbose, on slender pe-

duncles (rose-color or white), *involucel none; carpels obtusely beaked, crested and strongly wrinkled* on the back. ♃ (Sida alcæoides, *Michx.*) — Barren oak-lands, S. Kentucky and Tennessee.

4. NAPÆA, Clayt. GLADE MALLOW.

Calyx naked at the base, 5-toothed. *Flowers diœcious;* the staminate flowers entirely destitute of pistils, with 15 – 20 anthers; the fertile with a short column of filaments but no anthers. Styles 8 – 10, stigmatic along the inside. Fruit depressed-globular, separating when ripe into as many kidney-shaped 1-seeded beakless and scarcely dehiscent carpels as there are styles. Radicle pointing downwards. — A tall and roughish perennial herb, with very large 9 – 11-parted lower leaves, the pointed lobes pinnatifid-cut and toothed, and small white flowers in panicled clustered corymbs. (Named by Clayton from νάπη, a wooded valley or glade, or, poetically, the nymph of the groves, alluding to the place where he discovered the plant.)

1. **N. dioica,** L. (Sida dioica, *Cav.*) — Limestone valleys, Penn. and southward to the Valley of Virginia, west to Ohio and Illinois; rare. July.

5. SIDA, L. SIDA.

Calyx naked at the base, 5-cleft. Petals entire, usually oblique. Styles 5 or more: the ripe fruit separating into as many 1-seeded carpels, which remain closed, or commonly become 2-valved at the top, and tardily separate from the axis. Embryo abruptly bent; the radicle pointing upwards. Stigmas terminal, capitate. — Flowers perfect. (A name used by Theophrastus.)

1. **S. Napæa,** Cav. Nearly glabrous, tall (2° – 4° high), erect; *leaves 5-cleft,* the lobes oblong and pointed, toothed; *flowers* (*white*) *umbellate-corymbed,* large; carpels 10, pointed. ♃ (Napæa lævis & hermaphrodita, *L.*) — Rocky river-banks, Penn., *Muhlenberg.* Kanawha Co., Virginia, *Rev. J. M. Brown.* (Cultivated in old gardens.)

2. **S. Elliottii,** Torr. & Gray. Nearly glabrous (1° – 4° high); *leaves linear,* serrate, short-petioled; peduncles axillary, 1-flowered, short; *flowers* (*yellow*) rather large; *carpels* 9 – 10, *slightly and abruptly pointed,* forming a depressed fruit. ♃ — Sandy soil, Virginia (near Petersburg) and southward. May – Aug.

3. **S.** SPINÒSA, L. Minutely and softly pubescent, low (10′ – 20′ high), much branched; *leaves ovate-lanceolate or oblong,* serrate, rather long-petioled; peduncles axillary, 1-flowered, shorter than the petiole; *flowers* (*yellow*) small; *carpels* 5, combined into an ovate fruit, *each splitting at the top into* 2 *beaks.* A little tubercle at the base of the leaves on the stronger plants gives the specific name, but it cannot be called a spine. ① — Waste places, common southward and eastward. (Nat. from Trop. Amer. or Afr.)

6. ABÙTILON, Tourn. INDIAN MALLOW.

Carpels 2 – 9-seeded, at length 2-valved. Radicle ascending or pointing inwards. Otherwise as in Sida. (Name of unknown origin.)

1. **A.** AVICÉNNÆ, Gærtn. (VELVET-LEAF.) Tall (4° high); leaves roundish-heart-shaped, taper-pointed, velvety; peduncles shorter than the leaf-stalks; corolla yellow; pods 12–15, hairy, beaked. ① — Waste places, escaped from gardens. (Adv. from India.)

7. MODÌOLA, Mœnch. MODIOLA.

Calyx with a 3-leaved involucel. Petals obovate. Stamens 10–20. Stigmas capitate. Carpels 14–20, kidney-shaped, pointed and at length 2-valved at the top; the cavity divided into two by a cross partition, with a single seed in each cell. — Humble, procumbent or creeping annuals or biennials, with cut leaves and small purplish flowers solitary in the axils. (Name from *modiolus*, the broad and depressed fruit of combined carpels resembling in shape the Roman measure of that name.)

1. **M. multifida,** Mœnch. Hairy; leaves 3–5-cleft and incised; stamens 15–20; fruit hispid at the top. — Low grounds, Virginia and southward.

8. KOSTELÉTZKYA, Presl. KOSTELETZKYA.

Pod depressed, with a single seed in each cell. Otherwise as Hibiscus. (Named after Kosteletzky, a Bohemian botanist.)

1. **K. Virgínica,** Presl. Roughish-hairy (2°–4° high); leaves halberd-shaped and heart-shaped; the lower 3-lobed. ♃ (Hibiscus Virginicus, *L.*) — Marshes on the coast, Long Island, New Jersey, and southward. Aug. — Corolla 2′ wide, rose-color. Column slender.

9. HIBÍSCUS, L. ROSE-MALLOW.

Calyx involucellate at the base by a row of numerous bractlets, persistent, 5-cleft. Column of stamens long, bearing anthers for much of its length. Styles united: stigmas 5, capitate. Fruit a 5-celled pod, opening into 5 valves which bear the partition on their middle (loculicidal). Seeds several or many in each cell. — Herbs or shrubs, usually with large and showy flowers. (An old Greek and Latin name of unknown meaning.)

1. **H. Moscheùtos,** L. (SWAMP ROSE-MALLOW.) *Leaves ovate*, pointed, toothed, the lower 3-lobed, whitened underneath with a fine soft down; the 1-flowered peduncles often united at the base with the petioles; *calyx not inflated; seeds smooth.* ♃ — Borders of marshes along and near the coast, and banks of large rivers. Salt springs, Salina, New York. Aug., Sept. — Plant stout, 5° high. Corolla 5′ in diameter, pale rose-purple, or white with a crimson eye, showy.

2. **H. militàris,** Cav. (HALBERD-LEAVED MALLOW.) *Smooth throughout;* lower leaves ovate-heart-shaped, toothed, 3-lobed; *upper leaves halberd-form*, the short lateral lobes spreading at the base, the middle one prolonged and taper-pointed; peduncles slender; *fruiting calyx inflated; seeds hairy.* ♃ — River-banks, Penn., Ohio, and southward. Aug. — More slender and smaller-flowered than the last: corolla pale rose-color.

6. **H. Triònum**, L. (Bladder Ketmia.) *Somewhat hairy*; upper leaves deeply 3-parted, with lanceolate divisions, the middle one much the longest; fruiting *calyx inflated, membranaceous*, with bristly ribs, 5-*winged* at the summit; seeds rough. ① — Escaped from gardens into cultivated grounds. Corolla pale greenish-yellow with a pale eye, ephemeral; hence the name *Flower-of-an-hour*. (Adv. from Eu.)

H. Syrìacus, the Shrubby Althæa of the old gardeners, is cultivated about houses.

Abelmóschus esculéntus, the Okra, and A. Mánihot (the genus characterized by the spathaceous calyx, bursting on one side and deciduous), are common in gardens southward.

Gossýpium herbàceum, the Cotton-plant, is the most important plant of this family.

Order 24. TILIÀCEÆ. (Linden Family.)

Trees (rarely herbs), with the mucilaginous properties, fibrous bark, and valvate calyx, &c. of the Mallow Family; *but the sepals deciduous, petals imbricated in the bud, the stamens usually polyadelphous, and the anthers 2-celled*; — represented in Northern regions only by the genus

1. TÍLIA, L. Linden. Basswood.

Sepals 5. Petals 5, spatulate-oblong. Stamens numerous: filaments cohering in 5 clusters with each other (in European species), or with the base of a spatulate petal-like body placed opposite each of the real petals. Pistil with a 5-celled ovary and 2 half-anatropous ovules in each, a single style, and a 5-toothed stigma. Fruit a sort of woody globular nut, becoming 1-celled and 1–2-seeded. Embryo with a taper radicle, and a pair of leaf-like somewhat heart-shaped and lobed cotyledons, which are a little folded. — Fine trees, with soft and white wood, more or less heart-shaped and serrate leaves, oblique and often truncate at the base, deciduous stipules, and small cymes of flowers, hanging on an axillary peduncle which is united to a leaf-like bract. Flowers cream-color, honey-bearing, fragrant. (The classical name of the genus.)

1. **T. Americàna**, L. (Basswood.) Leaves green and glabrous or nearly so, thickish. — Rich woods. May, June. — This familiar tree is rarely called *Lime-tree*, oftener *White-wood*, commonly *Basswood*; the name (now obsolete in England) alluding to the use of the inner bark for mats and cordage.

Var. **pubéscens.** Leaves softly pubescent underneath, often thin. (T. pubescens, *Ait.* T. laxiflora, *Michx.*) — Common from Maryland southward and westward.

2. **T. heterophýlla**, Vent. (White Basswood.) Leaves smooth and bright green above, silvery-whitened with a fine down underneath. (T. alba, *Michx.*) — Mountains of Penn. to Kentucky and southward. — Leaves larger than in No. 1, often 8′ broad.

T. Europæa, the European Linden, which is planted in and near our cities as an ornamental tree, is at once distinguished from any native species by the absence of the petal-like scales among the stamens. This tree (the *Lind*) gave the family name to *Linnæus*.

ORDER 25. CAMELLIÀCEÆ. (CAMELLIA FAMILY.)

Trees or shrubs, with alternate simple feather-veined leaves, and no stipules; the regular flowers hypogynous and polyandrous, the sepals and petals both imbricated in æstivation, the stamens more or less united at the base with each other (monadelphous or 3–5-adelphous) and with the base of the petals.— Anthers 2-celled, introrse. Fruit a woody 3–5-celled loculicidal pod Seeds few, with little or no albumen. Embryo large, with broad cotyledons. — A family with showy flowers, the types of which are the well-known Camellia and the more important Tea Plant, — represented in this country by the two following genera.

1. STUÁRTIA, Catesby. STUARTIA.

Sepals 5, rarely 6, ovate or lanceolate. Petals 5, rarely 6, obovate, crenulate. Stamens monadelphous at the base. Pod 5-celled. Seeds 1–2 in each cell, crustaceous, anatropous, ascending. Embryo straight, nearly as long as the albumen: radicle longer than the cotyledons. — Shrubs with membranaceous deciduous oblong-ovate serrulate leaves, soft-downy beneath, and large short-peduncled flowers solitary in their axils. (Named for *John Stuart*, the well-known *Lord Bute.*)

1. **S. Virgínica,** Cav. Petals 5 white (1′ long); sepals ovate; style 1; stigma 5-toothed; pod globular, blunt; seeds not margined. (S. Malachodéndron, *L.*) — Woods, Virginia and southward.

S. PENTÁGYNA, L'Her., with cream-colored flowers, 5 styles, and an angled and pointed pod, may be found in the Alleghanies of S. Virginia.

2. GORDÒNIA, Ellis. LOBLOLLY BAY.

Sepals 5, rounded, concave. Petals 5, obovate. Stamens 5-adelphous, one cluster adhering to the base of each petal. Style 1. Pod ovoid, 5-valved; the valves separating from the persistent axis; cells 2–8-seeded. Seeds pendulous. Embryo straightish, with a short radicle, and thin longitudinally plaited cotyledons. — Shrubs or small trees, with large and showy white flowers on axillary peduncles. (Dedicated by Dr. Garden to his "old master, Dr. James Gordon of Aberdeen," and by Ellis to a London nurseryman of the same name.)

1. **G. Lasiánthus,** L. (LOBLOLLY BAY.) Leaves coriaceous and persistent, lanceolate-oblong, narrowed at the base, minutely serrate, smooth and shining; pod pointed; seeds winged above. Swamps near the coast, Virginia and southward. May–July. — Petals 1½′ long.

ORDER 26. LINÀCEÆ. (FLAX FAMILY.)

Herbs, with regular and symmetrical hypogynous flowers, 4–5-merous throughout, strongly imbricated calyx and convolute petals, the 5 stamens *monadelphous at the base, and an* 8–10-*seeded pod, having twice as many cells* (*complete or incomplete*) *as there are styles*; — consisting chiefly of the genus

1. LÌNUM, L. FLAX.

Sepals (persistent), petals, stamens, and styles 5, regularly alternate with each other. Pod of 5 united carpels (into which it splits in dehiscence) and 5-celled, with 2 seeds hanging from the summit of each; but each cell is partly or completely divided into two by a false partition which projects from the back of the carpel, thus becoming 10-celled. Seeds anatropous, mucilaginous, flattened, containing a large embryo with plano-convex cotyledons. — Herbs, with a tough fibrous bark, simple and sessile entire leaves (alternate or often opposite), without stipules, but often with glands in their place, and with corymbose or panicled flowers. Corolla usually ephemeral. (The classical name of the Flax.)

1. **L. Virginiànum,** L. (WILD FLAX.) *Leaves oblong-lanceolate,* the upper acute; flowers small, scattered on the corymbose or panicled branches, on very short peduncles turned to one side; sepals ovate, pointed, smooth; *petals yellow; styles distinct.* — Dry woods. June – Aug. ♃ — Stem 1° – 2° high. Pods depressed-globose, 10-celled, splitting at length into 10 closed pieces.

2. **L. Boòttii,** Planchon. (LARGER YELLOW FLAX.) *Leaves linear,* pointed; flowers racemose-scattered on the cymose branches; sepals ovate-lanceolate, sharp-pointed, 3-nerved, with rough glandular margins, scarcely longer than the globular imperfectly 10-celled pod; *petals sulphur yellow; styles united* for ⅓ – ½ their length. ① (L. rigidum, *Torr. & Gray,* in part.) — Dry soil, Rhode Island, Connecticut, Michigan to Wisconsin, and southward. June – Aug. — Stem slender, 1° – 2° high. Flowers larger than in No. 1.

L. RÍGIDUM, Pursh, may possibly occur in the western part of Wisconsin.

L. USITATÍSSIMUM, L., the COMMON FLAX, is occasionally spontaneous in cultivated grounds.

ORDER 27. OXALIDÀCEÆ. (WOOD-SORREL FAMILY.)

Plants with sour juice, compound leaves, and regular, symmetrical, hypogynous, 5-*merous,* 10-*androus, somewhat monadelphous flowers, the calyx imbricated and the petals convolute in the bud,* 5 *separate styles, and a* 5-*celled several-seeded pod.* — The principal genus is

1. ÓXALIS, L. WOOD-SORREL.

Sepals 5, persistent. Petals 5, withering after expansion. Stamens 10, monadelphous at the base, alternately shorter. Pod membranaceous, deeply 5-lobed, 5-celled, each cell opening on the back. Seeds few in each cell, pendulous from the axis, anatropous, their outer coat loose and separating. Embryo large and straight in fleshy albumen: cotyledons flat. — Herbs, with alternate or radical stipulate leaves, mostly of 3 obcordate leaflets, which close and droop at nightfall. (Name from ὀξύς, *sour.*)

* *Stemless: leaves and scapes from a rootstock or bulb: cells few-seeded.*

1. **O. Acetosélla,** L. (COMMON WOOD-SORREL.) *Rootstock creeping* and scaly-toothed; *scape 1-flowered;* petals white with reddish veins, often notched. — Deep cold woods, Massachusetts to L. Superior and northward: also southward in the Alleghanies. June. — Plant 2′–5′ high, sparsely hairy: the flower ¾′ broad. Leaflets broadly obcordate. (Eu.)

2. **O. violàcea,** L. (VIOLET WOOD-SORREL.) *Bulb scaly; scapes umbellately several-flowered,* longer than the leaves; petals violet. — Rocky places: most common southward. May, June. — Nearly smooth, 5′–9′ high. Leaves very broadly obcordate. Sepals tipped with a gland. Corolla 1′ broad.

* * *Stems leafy: peduncles axillary: cells several-seeded.*

3. **O. stricta,** L. (YELLOW WOOD-SORREL.) Annual or perennial? by running subterranean shoots; stems at first erect, branching; peduncles 2–6-flowered, longer than the leaves; petals yellow; pods elongated, erect in fruit. — Borders of woods, fields, and cultivated grounds common. May–Sept. — Varies greatly in appearance and in the size of its flowers, according to season and situation. O. corniculàta, *L.* is probably the same species. (Eu.?)

ORDER 28. GERANIÀCEÆ. (GERANIUM FAMILY.)

Plants with mostly regular and symmetrical hypogynous 5-*merous flowers, imbricated sepals and convolute petals,* 10 *stamens slightly monadelphous at the base, the alternate ones shorter and sometimes sterile, and* 5 *pistils cohering to a central prolonged axis, from which they separate at maturity by the curling back of the styles elastically, carrying with them the small* 1-*seeded pods.* — Calyx persistent. Ovules 2 in each carpel, pendulous, anatropous, usually but one ripening. Pods small and membranaceous, cohering to 5 shallow excavations in the base of the prolonged axis, usually torn open on the inner face when they are carried away by the recurving styles. Seed without albumen: cotyledons folded together and bent down on the short radicle. — Strong-scented herbs (or the Pelargoniums, which have somewhat irregular flowers, shrubby plants), with opposite or alternate stipulate leaves, and bitter astringent roots.

1. GERÀNIUM, L. CRANESBILL.

Stamens 10, all with perfect anthers, the 5 longer with glands at their base (alternate with the petals). Styles not twisted in fruit when they separate from the axis, smooth inside. — Stems forking. Peduncles 1–3-flowered. (An old Greek name, from γέρανος, *a crane;* the long fruit-bearing beak thought to resemble the bill of that bird.)

* *Root perennial.*

1. **G. maculàtum,** L. (WILD CRANESBILL.) Stem erect, hairy; leaves about 5-parted, the wedge-shaped divisions lobed and cut at the end; sepals slender-pointed; petals entire, light purple, bearded on the claw (½′ long).

—Open woods and fields. April – July. — Leaves somewhat blotched with whitish as they grow old.

* * *Root biennial or annual.*

2. **G. Caroliniànum**, L. (CAROLINA CRANESBILL.) Stems diffusely branched from the base, hairy; leaves about 5-parted, the divisions cleft and cut into numerous oblong-linear lobes; *sepals awn-pointed*, as long as the emarginate (pale rose-color) petals; *seeds very minutely reticulated* (under a lens). — Barren soil and waste places. May – July. — Flowers small: the peduncles and pedicels short. — A state with more notched petals and more reticulated seeds passes sometimes for G. dissectum, *L.*

3. G. PUSÌLLUM, L. (SMALL-FLOWERED CRANESBILL.) Stems procumbent, slender, minutely pubescent; leaves rounded kidney-form, 5 – 7-parted, the divisions mostly 3-cleft; *sepals awnless*, about as long as the 2-cleft (bluish-purple) petals; *seeds smooth.* — Waste places, New York. (Nat. from Eu.)

4. **G. Robertiànum**, L. (HERB ROBERT.) Sparsely hairy, diffuse; *leaves 3-divided, the divisions 2-pinnatifid;* sepals awned, shorter than the (purple) petals; *pods wrinkled; seeds smooth.* — Moist woods and shaded ravines. June – Oct. — Plant strongly odorous. (Eu.)

2. ERÒDIUM, L'Her. STORKSBILL.

The 5 shorter stamens sterile. Styles in fruit twisting spirally, bearded inside. Otherwise as Geranium. (Name from ἐρωδιός, *a heron.*)

1. **E.** CICUTÀRIUM, L'Her. Annual, hairy; stems low, spreading; leaves pinnate; the leaflets sessile, 1 – 2-pinnatifid; peduncles several-flowered. — Shore of Oneida Lake, New York, *Knieskern.* (Adv. from Eu.)

ORDER 29. BALSAMINÀCEÆ. (BALSAM FAMILY.)

Annuals, with succulent stems gorged with a bland watery juice, and very irregular hypogynous flowers, the 5 stamens somewhat united, and the pod bursting elastically. — Characters as in the principal genus.

1. IMPÀTIENS, L. BALSAM. JEWEL-WEED.

Calyx and corolla colored alike and confounded, imbricated in the bud. Sepals apparently only 4; the anterior one, which is notched at the apex, probably consisting of two combined; the posterior one (appearing anterior as the flower hangs on its stalk) largest, and forming a spurred sac. Petals 2, unequal-sided and 2-lobed (each consisting of a pair united). Stamens 5, short: filaments appendaged with a scale on the inner side, the 5 scales connivent and united over the stigma: anthers opening on the inner face. Ovary 5-celled: stigma sessile. Pod with evanescent partitions, and a thick axis bearing the several anatropous seeds, 5-valved, the valves coiling elastically and projecting the seeds in bursting. Embryo straight: albumen none. — Leaves simple, alternate, without stipules. Flowers axillary or panicled; often of two sorts, viz.

the larger ones, as described above, which seldom ripen seeds, and very small ones, which are fertilized early in the bud, when the floral envelopes never expand, nor grow to their full size, but are forced off by the growing pod and carried upwards on its apex. (Name from the sudden bursting of the pods when touched, whence also the popular appellation, *Touch-me-not*, or *Snap-weed.*)

1. **I. pállida,** Nutt. (PALE TOUCH-ME-NOT.) *Flowers pale yellow, sparingly dotted* with brownish-red; sac dilated and very obtuse, broader than long, tipped with a short incurved spur. — Moist shady places and along rills, in rich soil; most common northwestward. July - Sept. — Larger and greener than the next, with larger flowers. Leaves ovate, petioled, toothed.

2. **I. fúlva,** Nutt. (SPOTTED TOUCH-ME-NOT.) *Flowers orange-color, thickly spotted with reddish-brown;* sac longer than broad, acutely conical, tapering into a *strongly inflexed spur.* — Rills and shady moist places; common, especially southward. June - Sept. — Plant 2° - 4° high: the flowers loosely panicled at the ends of the branches, hanging gracefully on their slender nodding stalks, the open mouth of the cornucopiæ-shaped sepal upward. A *variety* is occasionally found with *spotless flowers,* which differs from the I. Noli-tangere of Europe chiefly in the more inflexed spur and smaller petals.

I. BALSÁMINA, L., is the BALSAM or *Ladies' slipper* of the garden.

TROPÆOLUM MAJUS, the familiar NASTURTIUM of gardens, is the type of a group intermediate between the Balsam and Geranium families and the next.

ORDER 30. LIMNANTHÀCEÆ. (LIMNANTHES FAMILY.)

Annual low herbs, with pinnated alternate leaves without stipules, and regular 3 - 5-merous flowers: calyx valvate in the bud: stamens twice as many as the petals: the one-seeded little fleshy fruits separate, but their styles united. — Consists of one 5-merous Californian genus (Limnanthes) with handsome flowers, sometimes cultivated in gardens, and the insignificant

1. FLŒRKEA, Willd. FALSE MERMAID.

Sepals 3. Petals 3, shorter than the calyx, oblong. Stamens 6, nearly hypogynous. Ovaries 3, opposite the sepals, united only at the base; the style rising in the centre: stigmas 3. Fruit of 3 (or 1 - 2) roughish fleshy achenia. Seed anatropous, erect, filled by the large embryo with its hemispherical fleshy cotyledons. — A small and inconspicuous annual, with minute solitary flowers on axillary peduncles. (Named after *Floerke*, a German botanist.)

1. **F. proserpinacoides,** Willd. — Marshes and river-banks, W. New England to Wisconsin and Kentucky. April - June. — Leaflets 3 - 5, lanceolate, sometimes 2 - 3-cleft. Taste slightly pungent.

ORDER 31. RUTÀCEÆ. (RUE FAMILY.)

Plants with simple or compound leaves, dotted with pellucid glands, abounding with a pungent or bitter-aromatic acrid volatile oil, hypogynous regular 3 - 5-merous flowers, the stamens as many or twice as many as the sepals; the

2–5 pistils separate or combined into a compound ovary of as many cells, raised on a prolongation of the receptacle (gynophore) or glandular disk. — Embryo large, curved or straight, usually in fleshy albumen. Styles commonly united or cohering, even when the ovaries are distinct. Fruit usually capsular. Leaves alternate or opposite. Stipules none. — A large family, chiefly of the Old World and the Southern hemisphere; the *Proper Rutaceæ*, represented in gardens by the Rue (Ruta gravèolens, *L.*), are mostly herbs; while our two genera, of trees or shrubs, belong to what has been called the order *Zanthoxylaceæ*, but are not distinct from the *Diosmeæ*.

1. ZANTHÓXYLUM, Colden. PRICKLY ASH.

Flowers diœcious. Sepals 4 or 5, obsolete in one species. Petals 4 or 5, imbricated in the bud. Stamens 4 or 5 in the sterile flowers, alternate with the petals. Pistils 2–5, separate, but their styles conniving or slightly united. Pods thick and fleshy, 2-valved when ripe, 1–2-seeded. Seed-coat crustaceous, black, smooth and shining. Embryo straight, with broad cotylédons. — Shrubs or trees, with mostly pinnate leaves, the stems and often the leafstalks prickly. Flowers small, greenish or whitish. (Name from ξανθός, *yellow*, and ξύλον, *wood*.)

1. **Z. Americànum,** Mill. (NORTHERN PRICKLY ASH. TOOTHACHE-TREE.) Leaves and *flowers in axillary clusters;* leaflets 4–5 pairs and an odd one, ovate-oblong, downy when young; calyx none; petals 5; pistils 3–5, with slender styles; *pods short-stalked.* — Rocky woods and river-banks; common northward. April, May. — A prickly shrub, with yellowish-green flowers appearing with the leaves. Bark, leaves, and pods very pungent and aromatic.

2. **Z. Caroliniànum,** Lam. (SOUTHERN PRICKLY ASH.) *Glabrous;* leaflets 3–5 pairs and an odd one, ovate or ovate-lanceolate, oblique, *shining above; flowers in a terminal cyme,* appearing after the leaves; sepals and petals 5; pistils 3, with short styles; *pods sessile.* — Sandy coast of Virginia, and southward. June. — A small tree, with very sharp prickles.

2. PTÈLEA, L. SHRUBBY TREFOIL. HOP-TREE.

Flowers polygamous. Sepals 3–5. Petals 3–5, imbricated in the bud. Stamens as many. Ovary 2-celled: style short: stigmas 2. Fruit a 2-celled and 2-seeded samara, winged all round, nearly orbicular. — Shrubs, with 3-foliolate leaves, and greenish-white small flowers in compound terminal cymes. (The Greek name of the Elm, applied to a genus with a somewhat similar fruit.)

1. **P. trifoliàta,** L. Leaflets ovate, pointed, downy when young. — Rocky places, Penn. to Wisconsin and southward. June. — A tall shrub. Fruit bitter, used as a substitute for hops. Odor of the flowers disagreeable; but not so much so as those of the

AILÁNTHUS GLANDULÓSUS, or TREE-OF-HEAVEN, — a cultivated tree allied to this family, — whose flowers, especially the staminate ones, redolent of anything but "airs from heaven," offer a serious objection to the planting of this ornamental tree near dwellings.

ORDER 32. ANACARDIÀCEÆ. (CASHEW FAMILY.)

Trees or shrubs, with a resinous or milky acrid juice, dotless alternate leaves, and small, often polygamous, regular pentandrous flowers, with a 1-celled and 1-ovuled ovary, but with 3 styles or stigmas. — Petals imbricated in the bud. Seed borne on a curved stalk that rises from the base of the cell, without albumen. Stipules none. Often poisonous. — Represented only by the genus

1. RHÚS, L. SUMACH.

Sepals 5. Petals 5. Stamens 5, inserted under the edge or between the lobes of a flattened disk in the bottom of the calyx. Fruit small and indehiscent, a sort of dry drupe. — Leaves (simple in R. Cótinus, the *Smoke-Plant* of gardens) usually compound. Flowers greenish-white or yellowish. (The old Greek and Latin name of the genus.)

§ 1. SÙMAC, DC. — *Flowers polygamous, in a terminal thyrsoid panicle: fruit globular, clothed with acid crimson hairs; the stone smooth: leaves odd-pinnate. (Not poisonous.)*

1. **R. typhìna,** L. (STAGHORN SUMACH.) *Branches and stalks densely velvety-hairy;* leaflets 11-31, pale beneath, oblong-lanceolate, pointed, serrate. — Hill-sides. June. — Shrub or tree 10°-30° high, with orange-colored wood.

2. **R. glàbra,** L. (SMOOTH SUMACH.) *Smooth, somewhat glaucous;* leaflets 11-31, whitened beneath, lanceolate-oblong, pointed, serrate. — Rocky or barren soil. June, July. — Shrub 2°-12° high.

3. **R. copallìna,** L. (DWARF SUMACH.) *Branches and stalks downy; petioles wing-margined* between the 9-21 oblong or ovate-lanceolate leaflets, which are oblique or unequal at the base, smooth and shining above. — Rocky hills. July. — Shrub 1°-7° high, with running roots. Leaflets variable, entire or sparingly toothed.

§ 2. TOXICODÉNDRON, Tourn. — *Flowers polygamous, in loose and slender axillary panicles: fruit globular, glabrous, whitish or dun-colored; the stone striate: leaves odd-pinnate or 3-foliolate, thin. (Poisonous to the touch even the effluvium in sunshine affecting some persons.)*

4. **R. venenàta,** DC. (POISON SUMACH or DOGWOOD.) — Smooth, or nearly so; *leaflets* 7-13, *obovate-oblong,* entire. (R. Vérnix, *L.*, partly.) — Swamps. June. — Shrub 6°-18° high. The most poisonous species. Also called, inappropriately, *Poison Elder* and *Poison Dogwood.*

5. **R. Toxicodéndron,** L. (POISON IVY. POISON OAK.) Climbing by rootlets over rocks, &c., or ascending trees; *leaflets* 3, *rhombic-ovate,* mostly pointed, and rather downy beneath, variously notched or cut-lobed, or entire — When climbing trees, it is R. radicans, *L.* — Thickets, &c. June.

§ 3. LOBÀDIUM, Raf. — *Flowers polygamo-diœcious, in clustered scaly-bracted spikes like catkins, preceding the leaves: disk 5-parted, large: fruit as in* § 1, *but flattish: leaves 3-foliolate.* (*Not poisonous.*)

6. **R. aromática,** Ait. (FRAGRANT SUMACH.) Leaves pubescent when young, thickish when old; leaflets 3, rhombic-ovate, unequally cut-toothed, the middle one wedge-shaped at the base; flowers pale yellow. — Dry rocky soil, Vermont to Michigan, Kentucky, and westward. April. — A low straggling bush, the crushed leaves sweet-scented.

ORDER 33. VITÀCEÆ. (VINE FAMILY.)

Shrubs with watery juice, usually climbing by tendrils, with small regular flowers, a minute truncated calyx, its limb mostly obsolete, and the stamens as many as the valvate petals and opposite them! Berry 2-celled, usually 4-seeded. — Petals 4–5, very deciduous, hypogynous or perigynous. Filaments slender: anthers introrse. Pistil with a short style or none, and a slightly 2-lobed stigma: ovary 2-celled, with 2 erect anatropous ovules from the base of each. Seeds bony, with a minute embryo at the base of the hard albumen, which is grooved on one side. — Stipules deciduous. Leaves palmately veined or compound: tendrils and flower-clusters opposite the leaves. Flowers small, greenish. (Young shoots, foliage, &c. acid.) — Consists of Vitis and one or two nearly allied genera.

1. VÌTIS, Tourn. GRAPE.

Calyx very short, usually with a nearly entire border or none at all, filled with a fleshy disk which bears the petals and stamens. — Flowers in a compound thyrsus; pedicels mostly umbellate-clustered. (The classical Latin name of the Vine.)

§ 1. VITIS proper. — *Petals* 5, *cohering at the top while they separate at the base, and so the corolla usually falls off without expanding:* 5 *thick glands or lobes of the disk alternating with the stamens, between them and the base of the ovary: flowers diœcious-polygamous in all the American species, exhaling a fragrance like that of Mignonette: leaves simple, rounded and heart-shaped, often variously and variably lobed.*

* *Leaves woolly beneath, when lobed having obtuse or rounded sinuses.*

1. **V. Labrúsca,** L. (NORTHERN FOX-GRAPE.) *Branchlets and young leaves very woolly; leaves continuing rusty-woolly beneath;* fertile panicles compact; *berries large* (½′–¾ in diameter). — Moist thickets, common. June. — Berries ripe in Sept., dark purple or amber-color, with a tough musky pulp. Improved by cultivation, it has given rise to the *Isabella Grape*, &c.

2. **V. æstivàlis,** Michx. (SUMMER GRAPE.) *Young leaves downy with loose cobwebby hairs beneath, smoothish when old, green above;* fertile panicles compound, long and slender: *berries small* (⅓′ or ¼′ in diameter), black with a bloom. — Thickets, common; climbing high. May, June. — Berries pleasant, ripe in Oct.

* * *Leaves smooth or nearly so and green both sides, commonly pubescent on the veins beneath, either incisely lobed or undivided.*

3. **V. cordifòlia,** Michx. (WINTER or FROST GRAPE.) *Leaves thin,* not shining, heart-shaped, acuminate, sharply and coarsely toothed, often obscurely 3-lobed; *panicles compound, large and loose; berries small* (¼′ broad), blue or black with a bloom, *very acerb,* ripening after frosts. — Var. RIPÀRIA: with the leaves broader and somewhat incisely toothed and cut-lobed. (V. riparia, *Michx.*) — Thickets and river-banks; common. May, June. — Flowers very sweet-scented.

4. **V. vulpìna,** L. (MUSCADINE or SOUTHERN FOX-GRAPE.) *Leaves shining both sides,* small, rounded with a heart-shaped base, very coarsely toothed with broad and bluntish teeth, seldom lobed; *panicles small, densely flowered; berries large* (½′ – ¾′ in diameter), *musky,* purplish without a bloom, ripe early in autumn. — River-banks, Maryland to Kentucky and southward. May. — Branchlets minutely warty. Fruit with a thick and tough skin. A variety yields the *Scuppernong Grape,* &c.

§ 2. CÍSSUS, L. — *Petals 4 or 5, usually expanding before or when they fall: disk thick and broad, usually 4 – 5-lobed, often somewhat perigynous: flowers commonly perfect.*

5. **V. indivìsa,** Willd. Nearly glabrous; tendrils few and small; *leaves heart-shaped* or truncate at the base, coarsely and sharply toothed, acuminate, not lobed; panicle small and loose; petals and stamens 5; style slender; berries small (of the size of a pea), 1 – 3-seeded. — River-banks, W. Virginia, banks of the Ohio, and southward. June.

6. **V. bipinnàta,** Torr. & Gray. Nearly glabrous, bushy and rather upright; *leaves twice pinnate or ternate,* the leaflets cut-toothed; tendrils none; panicle small, cymose; petals and stamens 5; calyx 5-toothed; disk very thick, adherent to the ovary; berries black, obovate when young. (Ampelopsis bipinnata, *Michx.*) — Rich soils, Virginia, Kentucky, and southward.

2. AMPELÓPSIS, Michx. VIRGINIAN CREEPER.

Calyx slightly 5-toothed. Petals concave, thick, expanding before they fall. Disk none. — Leaves digitate, with 5 oblong-lanceolate leaflets. Flower-clusters cymose. Tendrils fixing themselves by dilated sucker-like disks at their tips. (Name from ἄμπελος, *a vine,* and ὄψις, *appearance.*)

1. **A. quinquefòlia,** Michx. — A common woody vine, growing in low or rich grounds, climbing extensively, blossoming in July, ripening its small blackish berries in October. Also called *American Ivy.* Leaves turning bright crimson in autumn.

ORDER 34. RHAMNÀCEÆ. (BUCKTHORN FAMILY.)

Shrubs or small trees, with simple leaves, small and regular flowers (sometimes apetalous), with the 4 or 5 perigynous stamens as many as the valvate sepals and alternate with them, and accordingly opposite the petals! Drupe *or pod with only one seed in each cell, not arilled.* — Petals folded inwards in the bud, hooded or concave, inserted along with the stamens into the edge of the fleshy disk which lines the short tube of the calyx and often unites it to the lower part of the 2–5-celled ovary. Ovules solitary, anatropous, erect. Stigmas 2–5. Embryo large, with broad cotyledons, in sparing fleshy albumen. — Flowers often polygamous. Leaves mostly alternate: stipules small or obsolete. Branches often thorny. (Slightly bitter and astringent: the fruit often mucilaginous, commonly rather nauseous or drastic.)

Synopsis.

* Calyx and disk free from the ovary.

1. **BERCHEMIA.** Petals sessile, entire, as long as the calyx. Drupe with thin flesh and a 2-celled bony putamen.
2. **RHAMNUS.** Petals small, short-clawed, notched, or none. Drupe berry-like, with the 2-4 separate seed-like nutlets concave on the back: cotyledons leaf-like, revolute.
3. **FRANGULA.** Petals, &c. as in No. 2. Seed-like nutlets convex on the back: cotyledons plane, fleshy.

* * Calyx with the disk coherent with the base of the ovary.

4. **CEANOTHUS.** Petals long-clawed, hooded. Fruit dry, at length dehiscent.

1. BERCHÈMIA, Necker. SUPPLE-JACK.

Calyx with a very short and roundish tube; its lobes equalling the 5 oblong sessile acute petals, longer than the stamens. Disk very thick and flat, filling the calyx-tube and covering the ovary. Drupe oblong, with thin flesh and a bony 2-celled putamen. — Woody twining and climbing vines, with the pinnate veins of the leaves straight and parallel, the small greenish-white flowers in small panicles. (Name unexplained.)

1. **B. volùbilis,** DC. Glabrous; leaves oblong-ovate, acute, scarcely serrulate; style short, 2-toothed at the apex. — Damp soils, Virginia, and southward. June. — Ascending tall trees. Stems tough and very lithe, whence the popular name.

2. RHÁMNUS, Tourn. BUCKTHORN.

Calyx 4–5-cleft; the tube campanulate, lined with the disk. Petals small, short-clawed, notched at the end, wrapped around the short stamens, or sometimes none. Ovary free, 2–4-celled. Drupe berry-like (black), containing 2–4 separate seed-like nutlets, of cartilaginous texture, which are grooved on the back, as is the contained seed. Cotyledons foliaceous, the margins revolute. — Shrubs or small trees, with loosely pinnately veined leaves, and greenish polygamous or diœcious flowers in axillary clusters. (The ancient Greek name, from the numerous branchlets.)

* *Lobes of the calyx, petals, and stamens* 4.

1. R. CATHÁRTICUS, L. (COMMON BUCKTHORN.) *Leaves ovate,* minutely serrate; *fruit* 3–4-*seeded;* branchlets thorny. — Cultivated for hedges; spontaneous on the Hudson River, New York. (Adv. from Eu.)

2. **R. lanceolàtus,** Pursh. *Leaves oblong-lanceolate* and acute, or on flowering shoots oblong and obtuse, finely serrulate, smooth or minutely downy beneath; petals deeply notched; *fruit 2-seeded.* Hills and river-banks, Penn. (Mercersburg, *Prof. Green*) to Kentucky, and southward. May.—Shrub tall, not thorny; the yellowish-green flowers occurring under two forms, both commonly perfect: one with the short pedicels clustered in the axils and with long styles; the other, and more fruitful, with the pedicels oftener solitary, and the style very short.

* * *Lobes of the calyx and stamens* 5: *petals wanting.*

3. **R. alnifòlius,** L'Her. Leaves oval, acute, serrate, nearly straight-veined: fruit 3-seeded.—Swamps, Maine to Penn. and Wisconsin, northward. June.—Shrub 1°–4° high.

3. FRÁNGULA, Tourn. ALDER-BUCKTHORN.

Seeds not grooved or concave (but convex) on the back. Cotyledons plane, large and thick. Flowers perfect; the lobes of the calyx, petals, and stamens almost always 5. Leaves with nearly straight and parallel veins. Otherwise as in Rhamnus. (Name from *frango,* to break, in allusion to the brittleness of the stems.)

1. **F. Caroliniàna,** Gray. Thornless; leaves (3′–4′ long) oblong, obscurely serrulate, nearly glabrous, deciduous; peduncle of the small umbel of flowers very short; drupe spherical, 3-seeded.—River-banks, Virginia, Kentucky, and southward. June.—A tall shrub.

4. CEANÒTHUS, L. NEW JERSEY TEA. RED-ROOT.

Calyx 5-lobed; the lobes colored and incurved; the lower part with the thick disk cohering with the ovary, the upper separating across in fruit. Petals hood-form, spreading, on slender claws longer than the calyx. Filaments also elongated. Fruit 3-lobed, dry and splitting into its 3 carpels when ripe. Seed as in Frangula.—Shrubby plants; the flowers in little umbel-like clusters, which are crowded in dense panicles or corymbs at the summit of naked flower-branches: calyx and pedicels colored like the petals. (A name of Theophrastus, of unknown meaning and application.)

1. **C. Americànus,** L. (NEW JERSEY TEA.) Leaves ovate or oblong-ovate, 3-ribbed, serrate, downy beneath, often heart-shaped at the base; common peduncles elongated.—Dry woodlands. July.—An undershrub, 1°–3° high from a dark red root, varying exceedingly: branches downy. Flowers in pretty white clusters.—The leaves were used as a substitute for tea during the American Revolution.

2. **C. ovàlis,** Bigelow. Leaves narrowly oval or elliptical-lanceolate, finely glandular-serrate, glabrous or nearly so, as well as the short common peduncles.—Dry rocks, W. Vermont to Wisconsin, and westward. May.—A handsome low shrub, with the white flowers larger than in No. 1, more corymbed, and narrower smooth leaves, mostly acute at both ends. It also varies greatly.

ORDER 35. CELASTRÀCEÆ. (STAFF-TREE FAMILY.)

Shrubs with simple leaves, and small regular flowers, the sepals and the petals both imbricated in the bud, the 4 or 5 perigynous stamens as many as the petals and alternate with them, inserted on a disk which fills the bottom of the calyx. Seeds arilled. — Ovary 2 – 5-celled, with one or few anatropous (erect or pendulous) ovules in each cell: styles united into one. Fruit 2 – 5-celled, free from the calyx. Embryo large, in fleshy albumen: cotyledons broad and thin. Stipules minute and fugacious. Pedicels jointed. — Represented in the Northern States by two genera.

1. CELÁSTRUS, L. STAFF-TREE. SHRUBBY BITTER-SWEET.

Flowers polygamo-diœcious. Petals (crenulate) and stamens 5, inserted on the margin of a cup-shaped disk which lines the tube of the calyx. Pod globose (orange-color and berry-like), 3-celled, 3-valved, loculicidal. Seeds 1 – 2 in each cell, erect, enclosed by a pulpy scarlet aril. — Leaves alternate. Flowers small, greenish, in raceme-like clusters terminating the branches. (An ancient Greek name for some evergreen, which our plant is not.)

1. **C. scándens,** L. (WAX-WORK. CLIMBING BITTER-SWEET.) Woody, sarmentose and twining; leaves ovate-oblong, finely serrate, pointed. — Along streams and thickets. June. — The opening orange-colored pods, displaying the scarlet covering of the seeds, are very ornamental in autumn.

2. EUÓNYMUS, Tourn. SPINDLE-TREE.

Flowers perfect. Sepals 4 or 5, united at the base, forming a short and flat calyx. Petals 4 – 5, rounded, spreading. Stamens very short, inserted on the upper face of a broad and flat 4 – 5-angled disk, which coheres with the calyx and is stretched over the ovary, adhering to it more or less. Style short or none. Pod 3 – 5-lobed, 3 – 5-valved, loculicidal. Seeds 1 – 2 in each cell, enclosed in a red aril. — Shrubs, with 4-sided branchlets, opposite serrate leaves, and loose cymes of small flowers on axillary peduncles. (Deriv. from εὖ, *good* and ὄνομα, *name*, because it has the bad reputation of poisoning cattle. *Tourn.*)

1. **E. atropurpùreus,** Jacq. (BURNING-BUSH. WAAHOO.) Shrub tall (6° – 14° high) and upright; *leaves petioled*, oval-oblong, pointed; parts of the (dark purple) flower commonly in fours; *pods smooth, deeply lobed.* — New York to Wisconsin and southward: also cultivated. June. — Ornamental in autumn, by its copious crimson fruit, drooping on long peduncles.

2. **E. Americànus,** L. (STRAWBERRY BUSH.) Shrub low, upright or straggling (2° – 5° high); *leaves almost sessile, thickish*, bright green, varying from ovate to oblong-lanceolate, acute or pointed; parts of the greenish-purple flowers mostly in fives; *pods rough-warty, depressed*, crimson when ripe, the aril scarlet. — Wooded river-banks, W. New York to Illinois and southward. June.

Var. **obovàtus,** Torr. & Gray. Trailing, with rooting branches; flowering stems 1° – 2° high; leaves thin and dull, obovate or oblong. (E. obovatus, *Nutt.*) — Low or wet places.

ORDER 36. SAPINDÀCEÆ. (SOAPBERRY FAMILY.)

Trees, shrubs, or rarely herbs, with simple or compound leaves, mostly unsymmetrical and often irregular flowers, the 4 – 5 sepals and petals both imbricated in æstivation, the 5 – 10 stamens inserted on a fleshy (perigynous or hypogynous) disk, a 2 – 3-celled and lobed ovary, with 1 – 2 (or rarely more) ovules in each cell, and the embryo (except Staphylea) *curved or convolute, without albumen.* — A large order, the true Sapindaceæ principally tropical, none of them indigenous in the Northern States, except the Buckeyes: — to it may be appended the Bladder-nut and Maple Families.

SUBORDER I. STAPHYLEACEÆ. THE BLADDER-NUT FAMILY.

Flowers (perfect) regular; stamens as many as the petals. Ovules 1 – 8 in each cell. Seeds bony, with a straight embryo in scanty albumen. — Shrubs with opposite pinnately compound leaves, stipulate and stipellate.

1. STAPHYLEA. Lobes of the colored calyx and petals 5, erect. Stamens 5. Fruit a 3-celled bladdery-inflated pod.

SUBORDER II. SAPINDACEÆ proper (including HIPPOCASTANEÆ).

Flowers (often polygamous) mostly unsymmetrical and irregular; the stamens commonly more numerous than the petals or sepals, but rarely twice as many. Ovules 1 – 2 in each cell. Albumen none. Embryo curved or convolute, rarely straight: cotyledons thick and fleshy. — Leaves alternate or sometimes opposite, destitute of stipules, mostly compound.

2. ÆSCULUS. Calyx 5-lobed. Petals 4 or 5. Stamens commonly 7. Fruit a leathery pod. Leaves opposite, digitate.

SUBORDER III. ACERINEÆ. THE MAPLE FAMILY.

Flowers (polygamous or diœcious) regular, but usually unsymmetrical. Petals sometimes wanting. Ovary 2-lobed and 2-celled, with a pair of ovules in each cell. Winged fruits 1-seeded. Albumen none. Embryo coiled or folded; the cotyledons long and thin. — Leaves opposite, simple or compound.

3. ACER. Flowers polygamous. Leaves simple, or rarely digitately compound
4. NEGUNDO. Flowers diœcious. Leaves pinnate, with 3 – 5 leaflets.

SUBORDER I. STAPHYLEÀCEÆ. THE BLADDER-NUT FAMILY

1. STAPHYLÈA, L. BLADDER-NUT.

Calyx deeply 5-parted, the lobes erect, whitish. Petals 5, erect, spatulate, inserted on the margin of the thick perigynous disk which lines the base of the calyx. Stamens 5, alternate with the petals. Pistil of 3 several-ovuled carpels, united in the axis, their long styles cohering at first. Pod large, membranaceous, inflated, 3-lobed, 3-celled, at length bursting at the summit; the cells containing 1 – 4 bony anatropous seeds. Aril none. Embryo large and straight, in scanty albumen; cotyledons broad and thin. — Upright shrubs, with opposite pinnate leaves of 3 or 5 serrate leaflets, and white flowers in drooping raceme-like clusters, terminating the branchlets. Stipules and stipels deciduous. (Name from σταφυλή, *a cluster*.)

1. **S. trifòlia,** L. (AMERICAN BLADDER-NUT.) Leaflets 3, ovate, pointed. — Thickets, in moist soil. May. — Shrub 10° high, with greenish striped branches.

SUBORDER II. SAPINDÀCEÆ PROPER.

2. ÆSCULUS, L. HORSE-CHESTNUT. BUCKEYE.

Calyx tubular, 5-lobed, often rather oblique or gibbous at the base. Petals 4, sometimes 5, more or less unequal, with claws, nearly hypogynous. Stamens 7 (rarely 6 or 8): filaments long and slender, often unequal. Style 1: ovary 3-celled, with 2 ovules in each, only one of which, or one in each cell, forms a seed. Seed very large, with a thick and shining coat, and a large and round pale scar, without albumen. Cotyledons very thick and fleshy, their contiguous faces more or less united, remaining under ground in germination: plumule 2-leaved: radicle curved. — Trees or shrubs. Leaves opposite, digitate: leaflets serrate, straight-veined, like a Chestnut-leaf. Flowers in a terminal thyrsus or dense panicle, often polygamous, the greater portion with imperfect pistils and sterile. Pedicels jointed. Seeds farinaceous, but imbued with an intensely bitter and narcotic principle. (The ancient name of some Oak or other mast bearing tree.)

§ 1. ÆSCULUS PROPER. — *Fruit covered with prickles when young.*

1. **Æ.** HIPPOCÁSTANUM, L. (COMMON HORSE-CHESTNUT.) Corolla spreading, white spotted with purple and yellow, of 5 petals; stamens declined; leaflets 7. — Commonly planted. (Adv. from Asia via Eu.)

2. **Æ. glàbra,** Willd. (FETID or OHIO BUCKEYE.) Stamens curved, much longer than the pale yellow corolla of 4 upright petals; fruit prickly when young; leaflets 5. — River-banks, W. Penn. and Virginia to Michigan and Kentucky. June. — A small tree; the bark exhaling an unpleasant odor, as in the rest of the genus. Flowers small, not showy.

§ 2. PÀVIA, Boerh. — *Fruit smooth: petals* 4, *erect and conniving; the* 2 *upper smaller and longer than the others, consisting of a small and rounded blade on a very long claw.*

3. **Æ. flàva,** Ait. (SWEET BUCKEYE.) *Stamens included* in the yellow corolla; *calyx oblong-campanulate;* leaflets 5, sometimes 7, glabrous, or often minutely downy underneath. — Rich woods, Virginia to Ohio, Indiana, and southward. May. A large tree, or a shrub.

Var. **purpuráscens.** Flowers (both calyx and corolla) tinged with flesh-color or dull purple; leaflets commonly downy beneath. (Æ. discolor. *Pursh, &c.*) — From W. Virginia southward and westward.

4. **Æ. Pàvia,** L. (RED BUCKEYE.) Stamens not longer than the corolla, which is bright red, as well as the *tubular calyx;* leaflets glabrous or soft-downy beneath. — Fertile valleys, Virginia, Kentucky, and southward. May. — A shrub or small tree.

SUBORDER III. ACERÍNEÆ. THE MAPLE FAMILY.

3. ÀCER, Tourn. MAPLE.

Flowers polygamous. Calyx colored, 5- (rarely 4-12-) lobed or parted. Petals either none, or as many as the lobes of the calyx, equal, with short claws if any, inserted on the margin of the lobed disk, which is either perigynous or hypogynous. Stamens 4-12. Ovary 2-celled, with a pair of ovules in each: styles 2, long and slender, united only below, stigmatic down the inside. From the back of each ovary grows a wing, converting the fruit into two 1-seeded, at length separable, closed samaras or keys. Seed without albumen. Embryo variously coiled or folded, with large and thin cotyledons. — Trees, or sometimes shrubs, with opposite palmately-lobed leaves, and small flowers. Pedicels not jointed. (The classical name, from the Celtic *ac*, hard.)

* *Flowers in terminal racemes, greenish, appearing after the leaves: stamens* 6-8.

1. **A. Pennsylvánicum,** L. (STRIPED MAPLE.) Leaves 3-lobed at the apex, finely and sharply doubly serrate; the short lobes taper-pointed, and also serrate; *racemes drooping, loose; petals obovate;* fruit with large diverging wings. (A. striàtum, *Lam.*) — Rich woods, Maine to Wisconsin, and northward along the Alleghanies to Virginia and Kentucky. June. — A small and slender tree, with light-green bark striped with dark lines, and greenish flowers and fruit. Also called *Striped Dogwood*, and *Moose-Wood.*

2. **A. spicàtum,** Lam. (MOUNTAIN MAPLE.) Leaves downy underneath, 3- (or slightly 5-) lobed, coarsely serrate, the lobes taper-pointed; *racemes upright, dense,* somewhat compound; *petals linear-spatulate;* fruit with small very divergent wings. (A. montànum, *Ait.*) — Moist woods, with the same range as No. 1. June. — A tall shrub, forming clumps.

* * *Flowers umbellate-corymbed, greenish-yellow, appearing with the leaves.*

3. **A. saccharìnum,** Wang. (SUGAR MAPLE. ROCK MAPLE.) Leaves 3-5-lobed, with rounded sinuses and pointed sparingly sinuate-toothed lobes, either heart-shaped or nearly truncate at the base, whitish and smooth or a little downy along the veins beneath; flowers from terminal leaf-bearing and lateral leafless buds, drooping on very slender hairy pedicels; calyx hairy at the apex; petals none; wings of the fruit broad, slightly diverging. — Rich woods, especially northward and along the mountains southward. April, May. — A large, handsome tree.

Var. **nìgrum.** (BLACK SUGAR-MAPLE.) Leaves scarcely paler beneath, but often minutely downy, the lobes wider, the sinus at the base often closed. (A. nigrum, *Michx.*) — With the ordinary form.

* * * *Flowers in umbel-like clusters arising from lateral leafless buds, preceding the leaves: stamens* 3-6.

4. **A. dasycárpum,** Ehrhart. (WHITE or SILVER MAPLE.) *Leaves very deeply 5-lobed* with the sinuses rather acute, silvery-white (and when young downy) underneath, the divisions narrow, cut-lobed and toothed; flowers (greenish-yellow) on short pedicels; *petals none; fruit woolly when young,* with large divergent wings. — River-banks, most common southward and westward. March, April. — A fine ornamental tree.

5. **A. rùbrum,** L. (RED or SWAMP MAPLE.) *Leaves* 3 – 5 *lobed* with the sinuses acute, whitish underneath; the lobes irregularly serrate and notched, acute, the middle one usually longest; *petals linear-oblong;* flowers on very short pedicels (scarlet, crimson, or sometimes yellowish); but the *fruit smooth,* on prolonged drooping pedicels. — Swamps and wet woods; everywhere. March, April. — A small tree, with reddish twigs; the leaves varying greatly in shape, turning bright crimson in early autumn.

A. PSEUDO-PLÁTANUS, L., the FALSE SYCAMORE, and A. PLATANOÌDES, L., called NORWAY MAPLE, are two European species occasionally planted.

4. NEGÚNDO, Mœnch. ASH-LEAVED MAPLE. BOX-ELDER.

Flowers diœcious. Calyx minute, 4 – 5-cleft. Petals none. Stamens 4 – 5. — Sterile flowers in clusters on capillary pedicels; the fertile in drooping racemes, from lateral buds. Leaves pinnate, with 3 or 5 leaflets. (Name unmeaning. The genus, apparently of only a single species, is too near Acer itself.)

1. **N. aceroìdes,** Mœnch. (Acer Negundo, *L.*) Leaflets smoothish when old, very veiny, ovate, pointed, toothed; fruit smooth, with large rather incurved wings. — River-banks. Penn. to Wisconsin, and southward. April. — A small but handsome tree, with light-green twigs, and very delicate drooping clusters of small greenish flowers, rather preceding the leaves.

ORDER 37. POLYGALÀCEÆ. (MILKWORT FAMILY.)

Plants with irregular, as if papilionaceous, hypogynous flowers, 4 – 8 *diadelphous or monadelphous stamens, their* 1*-celled anthers opening at the top by a pore or chink; the fruit a* 2*-celled and* 2*-seeded pod.* — Represented by the typical genus

1. POLÝGALA, Tourn. MILKWORT.

Flower very irregular. Calyx persistent, of 5 sepals, of which 3 (the upper and the 2 lower) are small and often greenish, while the two lateral or inner (called *wings*) are much larger, and colored like the petals. Petals 3, hypogynous, connected with each other and with the stamen-tube, the middle (lower) one keel-shaped and often crested on the back. Stamens 6 or 8: their filaments united below into a split sheath, or into 2 sets, cohering more or less with the petals, free above: anthers 1-celled, often cup-shaped, opening by a hole or broad chink at the apex. Ovary 2-celled, with a single anatropous ovule pendulous in each cell: style prolonged and curved: stigma various. Fruit a small, loculicidal 2-seeded pod, usually rounded and notched at the apex, much flattened contrary to the very narrow partition. Seeds with a caruncle, or variously shaped appendage, at the hilum. Embryo large, straight, with flat and broad cotyledons, surrounded by a sparing albumen. — Bitter plants (low herbs in temperate regions), with simple entire leaves, often dotted, and no stipules: sometimes bearing concealed fertile flowers also next the ground. (An old name, from πολὺς, *much*, and γάλα, *milk*, from a fancied property of its increasing this secretion.)

* *Biennial* (6′ – 12′ *high*) : *flowers yellow : crest of the keel small.*

1. **P. lùtea,** L. *Flowers in solitary ovate or oblong heads*, terminating the stem or simple branches (*bright orange-yellow*) ; leaves (1′ – 2′ long) obovate or spatulate ; lobes of the *caruncle nearly as long as the seed.* — Sandy swamps, New Jersey and southward, near the coast. June – Sept. — Stems at first simple. Head of flowers ¾′ in diameter, showy.

2. **P. ramòsa,** Ell. *Flowers* (*citron-yellow*) *in numerous short and dense spike-like racemes* collected in a flat-topped *compound cyme ;* leaves oblong-linear, the lowest spatulate or obovate ; *seeds* ovoid, minutely hairy, *twice the length of the caruncle.* (P. cymosa, *Poir.*, not of *Walt.* P. corymbosa, *Nutt.*) — Damp pine-barrens, New Jersey ? Delaware, and southward. — Flowers turning green in drying. (The allied P. CYMÒSA, Walt., which is P. graminifolia, *Poir.*, P. attenuata, *Nutt.*, P. acutifolia, *Torr. & Gray*, — known by its simpler cymes, stem naked above, narrower leaves, and globular seeds with no caruncle, — probably occurs in S. Virginia.)

* * *Annual : flowers purple or white, in spikes ; no subterranean blossoms : crest of the keel minute, except in Nos.* 3, 9, *and* 10.

+– *Leaves all alternate or scattered : flowers purple or flesh-color.*

3. **P. incarnàta,** L. Glaucous ; stem slender, simple or sparingly branched (1° high) ; leaves small, linear-awl-shaped ; spike oblong or cylindrical ; *wings much shorter than the conspicuously crested corolla ; claws of the petals united in a very long and slender cleft tube ;* caruncle 2-lobed, longer than the stalk of the hairy seed. — Dry soil, Maryland and Ohio to Wisconsin and southward. July.

4. **P. sanguínea,** L. Stem branched at the top (6′ – 10′ high) ; *leaves oblong-linear ;* spikes roundish or oblong, dense, very obtuse ; *wings broadly ovate, obtuse ; caruncle almost as long as the seed.* (P. purpùrea, *Nutt.*) — Sandy and moist ground ; common. July – Sept. — Spikes ½′ thick, reddish-purple : the axis, as in Nos. 5 and 6, beset with the persistent awl-shaped scaly bracts after the flowers have fallen.

5. **P. fastigiàta,** Nutt. Stem slender, at length much branched above ; leaves linear ; spikes short ; *wings ovate-oblong, tapering at the base into distinct claws ; caruncle as long as, and nearly enveloping, the stalk-like base of the minutely hairy seed.* (P. sanguinea, *Torr. & Gr.*, excl. syn. ; not of *Nutt.*, nor *L.*) — Pine barrens of New Jersey (*Nuttall*) to Kentucky and southward. — Spikes looser, and the rose-purple flowers much smaller, than in No. 4, brighter-colored than in the next, which it most resembles.

6. **P. Nuttállii,** Torr. & Gr. (*Fl.* 1, *p.* 670, excl. syn., & descr.) Stem branched above (4′ – 9′ high) ; leaves linear ; spikes oblong, dense ; *wings elliptical, on very short claws ; caruncle small and applied to one side of the stalk-like base of the very hairy seed.* (P. sanguinea, *Nutt.*, not of *L.* P. Mariana, &c., *Pluk.*, *t.* 437. P. ambigua, *Torr. & Gr.*, *Fl.*, not of *Nutt.*) — Dry sandy soil, coast of Massachusetts to Penn. and southward. Aug. — Spikes ¼′ in diameter ; the flowers light purple and greenish, duller-colored than in the last, with thicker

wings on shorter claws; and the narrow caruncle not longer than the stalk-like base of the pear-shaped seed.

+ + *Leaves, at least the lower ones, in whorls.*

++ *Flowers middle-sized, in thick spikes, rose-color or greenish-purple.*

7. **P. cruciàta,** L. Low, with spreading opposite branches; leaves nearly all in fours (rarely fives), linear and somewhat spatulate or oblanceolate; *spikes sessile or nearly so,* dense, oblong becoming cylindrical; bracts persistent; *wings broadly deltoid-ovate, slightly heart-shaped, tapering to a bristly point;* caruncle nearly as long as the seed. — Margin of swamps, Maine to Virginia and southward near the coast, and along the Great Lakes. Aug. - Sept. — Stems 3′ - 10′ high, with almost winged angles. Spikes fully ½′ in diameter.

8. **P. brevifòlia,** Nutt. Rather slender, branched above; leaves in fours, or scattered on the branches, narrowly spatulate-oblong; *spikes peduncled,* oblong, rather loose; *wings lanceolate-ovate, pointless or barely mucronate.* — Margin of sandy bogs, Rhode Island (*Olney*), New Jersey and southward. Sept. — Closely allied to the last, probably only a marked variety of it.

++ ++ *Flowers small, in slender elongated spikes, greenish-white, rarely tinged with purple: the crest rather large in proportion.*

9. **P. verticillàta,** L. Slender (6′ - 10′ high), much branched; *stem-leaves in fours or fives, those of the branches scattered, linear, acute; spikes* peduncled, dense, acute; bracts falling with the flowers; *wings round, clawed;* the 2-lobed caruncle half the length of the seed. — Dry soil; common. June - Oct.

10. **P. ambígua,** Nutt. Very slender, loosely branched; *lowest stem-leaves in fours, the rest scattered,* narrowly linear; *spikes long-peduncled, very slender,* the flowers often scattered; *wings oval;* caruncle shorter; otherwise nearly as in No. 9 (of which it is probably a mere variety). — Dry woods, from New York southward.

* * * *Perennial: flowers white, spiked; no subterranean blossoms.*

11. **P. Sénega,** L. (SENECA SNAKEROOT.) Stems several from a thick and hard knotty root, simple (6′ - 12′ high); leaves lanceolate or oblong-lanceolate, with rough margins, alternate; spike cylindrical, the flowers on extremely short pedicels; wings round-obovate, concave; crest short; caruncle nearly as long as the seed. — Rocky open woods or plains, W. New England to Wisconsin, Kentucky, and Virginia. May, June.

Var. **latifòlia,** Torr. & Gray. Taller (9′ - 16′ high), sometimes branched; leaves ovate or ovate-lanceolate, very large (2′ - 4′ long), tapering to each end. Kentucky, *Short.*

* * * * *Biennial or perennial: flowers rose-purple, showy, crested; also bearing whitish and inconspicuous more fertile ones, with imperfect corollas, on subterranean branches.*

12. **P. polýgama,** Walt. Stems numerous from the *biennial* root, mostly simple, ascending, very leafy (6′ to 9′ high); *leaves oblanceolate or oblong,* alternate; terminal *raceme many-flowered,* the broadly obovate wings longer than the keel; stamens 8; radical flowers racemed on short runners on or beneath the ground; lobes of the caruncle 2, scale-like, shorter than the seed. (**P. rubélla,** *Muhl.*) — Dry sandy soil; common. — July.

13. **P. paucifòlia**, Willd. *Perennial;* flowering stems short (3′–4 high), and leafy chiefly at the summit, rising from long and slender prostrate or subterranean shoots, which also bear concealed fertile flowers; lower leaves small and scale-like, scattered; the *upper leaves ovate, petioled, crowded; flowers* 1–3, *large,* peduncled; wings obovate, rather shorter than the conspicuously fringe-crested keel; stamens 6; caruncle of 2–3 awl-shaped lobes longer than the seed. — Woods in light soil; not rare northward, extending southward along the Alleghanies. May. — A delicate plant, with large and very handsome flowers, ¾′ long, rose-purple, or rarely pure white. Sometimes called *Flowering Wintergreen*, but more appropriately FRINGED POLYGALA.

ORDER 38. LEGUMINÒSÆ. (PULSE FAMILY.)

Plants with papilionaceous or sometimes regular flowers, 10 (*rarely* 5, *and sometimes many*) *monadelphous, diadelphous, or rarely distinct stamens, and a single simple free pistil, becoming a legume in fruit. Seeds without albumen. Leaves alternate, with stipules, usually compound.* One of the sepals inferior (i. e. next the bract); one of the petals superior (i. e next the axis of the inflorescence). — A very large order (nearly free from noxious qualities), of which the principal representatives in this and other northern temperate regions belong to the first of the three suborders it comprises.

SUBORDER I. PAPILIONACEÆ. THE PROPER PULSE FAMILY.

Calyx of 5 sepals, more or less united, often unequally so. Corolla perigynous (inserted into the base of the calyx), of 5 irregular petals (or very rarely fewer), imbricated in the bud, more or less distinctly *papilionaceous,* i. e. with the upper or odd petal, called the *vexillum* or *standard,* larger than the others and enclosing them in the bud, usually turned backward or spreading; the two lateral ones, called the *wings,* oblique and exterior to the two lower petals, which last are connivent and commonly more or less coherent by their anterior edges, forming a body named the *carina* or *keel,* from its resemblance to the keel or prow of a boat, and which usually encloses the stamens and pistil. Stamens 10, very rarely 5, inserted with the corolla, monadelphous, diadelphous (mostly with 9 united in one set in a tube which is cleft on the upper side, i. e. next the standard, and the tenth or upper one separate), or occasionally distinct. Ovary 1-celled, sometimes 2-celled by an infolding of one of the sutures, or transversely many-celled by cross-division into joints: style simple: ovules amphitropous, very rarely anatropous. Cotyledons large, thick or thickish: radicle almost always incurved. — Leaves simple or simply compound, the earliest ones in germination usually opposite, the rest alternate: leaflets almost always quite entire. Flowers perfect, solitary and axillary, or in spikes, racemes, or panicles.

Synopsis.

TRIBE I. **LOTEÆ.** Stamens monadelphous or diadelphous (9 & 1). Pod continuous and 1-celled, or sometimes 2-celled lengthwise. Cotyledons becoming green leaves in germination. — Not twining, climbing, nor tendril-bearing. (Wistaria is an exception in its climbing stems.)

Subtribe 1. GENISTEÆ. Stamens monadelphous: anthers of 2 forms. Leaves simple or palmately compound.

1. LUPINUS. Calyx deeply 2-lipped. Keel scythe-shaped. Pod flattish. Leaves palmate.
2. CROTALARIA. Calyx 5-lobed. Keel scythe-shaped. Pod inflated.
3. GENISTA. Calyx somewhat 2-lipped. Keel straight. Pod flat. Leaves simple.

Subtribe 2. TRIFOLIEÆ. Stamens diadelphous (9 & 1): anthers uniform. Leaves palmately or rarely pinnately 3-5-foliolate; the earliest ones in germination after the cotyledons alternate! — Herbs or scarcely shrubby plants.

4. TRIFOLIUM. Flowers capitate. Pods membranaceous, 1-6-seeded.
5. MELILOTUS. Flowers racemed. Pods coriaceous, wrinkled, 1-2-seeded.
6. MEDICAGO. Flowers racemed or spiked. Pods curved or coiled.

Subtribe 3. PSORALEÆ. Stamens monadelphous or diadelphous. Pod 1-seeded and indehiscent, mostly included in the calyx, rarely 2-seeded. Plants sprinkled with dark dots or glands. Earliest true leaves opposite.

7. PSORALEA. Corolla truly papilionaceous. Stamens 10, more or less diadelphous, half of the anthers often imperfect.
8. DALEA. Corolla imperfectly papilionaceous. Stamens 9 or 10, monadelphous; the cleft tube of filaments bearing 4 of the petals about its middle.
9. PETALOSTEMON. Corolla scarcely at all papilionaceous. Stamens 5, monadelphous; the cleft tube of filaments bearing 4 of the petals on its summit.
10. AMORPHA. Corolla consisting of only one petal! the standard. Stamens 10, monadelphous at the base.

Subtribe 4. GALEGEÆ. Stamens mostly diadelphous. Pod several-seeded, at length 2-valved, 1-celled. Leaves pinnate.

11. ROBINIA. Wings of the corolla free from the keel. Pod flat and thin, margined on one edge. Trees or shrubs: leaflets stipellate.
12. WISTARIA. Wings free from the falcate keel. Pod tumid, marginless. Woody twiners: leaflets not stipellate.
13. TEPHROSIA. Wings cohering with the keel. Pod flat, marginless. Herbs.

Subtribe 5. ASTRAGALEÆ. Stamens diadelphous. Pod 2-celled lengthwise by the introflexion of the dorsal suture, or 1-celled with one or the other suture somewhat turned inward. Leaves pinnate.

14. ASTRAGALUS. Keel not pointed. Herbs, or low scarcely woody plants.

TRIBE II. **HEDYSAREÆ.** Stamens monadelphous or diadelphous. Pod (loment) transversely 2-several-jointed, the reticulated 1-seeded joints remaining closed, or sometimes reduced to one such joint.

* Leaves pinnate, with several leaflets.

15. ÆSCHYNOMENE. Stamens equally diadelphous (5 & 5). Calyx 2-lipped. Pod several-jointed.
16. HEDYSARUM. Stamens unequally diadelphous (9 & 1). Calyx 5-cleft. Pod several-jointed.

* * Leaves pinnately 3-foliolate.

17. DESMODIUM. Stamens diadelphous (9 & 1) or monadelphous below. Calyx 2-lipped. Pod several-jointed. Flowers all of one sort and complete. Leaflets stipellate

18. LESPEDEZA. Stamens diadelphous (9 & 1): anthers uniform. Pod 1-2-jointed. Flowers often of 2 sorts, the more fertile ones apetalous. Leaflets not stipellate.

19. STYLOSANTHES. Stamens monadelphous: anthers of 2 forms. Pod 1-2-jointed. Flowers of 2 sorts intermixed, the fertile apetalous. Leaflets not stipellate.

TRIBE III. **VICIEÆ.** Stamens diadelphous (9 & 1). Pod continuous, 1-celled. Cotyledons very thick and fleshy (as in a pea), not rising to the surface, but remaining under ground in germination.—Herbs, with abruptly pinnate leaves, the common leafstalk produced into a tendril or bristle. Peduncles axillary.

20. VICIA. Style filiform, bearded round the apex, or down the side next the keel-petals

21. LATHYRUS. Style flattened, bearded on the side towards the standard.

TRIBE IV. **PHASEOLEÆ.** Stamens more or less diadelphous (9 & 1). Pod continuous, not jointed, nor more than 1-celled, except by cellular matter sometimes deposited between the seeds, 2-valved. Cotyledons thick and fleshy, usually rising to the surface, but remaining nearly unchanged (as in a bean, seldom foliaceous) in germination.—Twining or trailing plants, with pinnately 3-foliolate, rarely 5-7-foliolate leaves, mostly stipellate, destitute of tendrils. Flowers often clustered in the racemes.

* Keel spirally twisted. Cotyledons thick, nearly unchanged in germination.

22. PHASEOLUS. Keel spiral. Leaves 3-foliolate, stipellate.

23. APIOS. Keel incurved, at length twisted. Leaves 5-7-foliolate, not stipellate.

* * Keel straight. Cotyledons not so thick.

+ Ovary 1-2-ovuled.* Leaflets not stipellate. Flowers yellow.

24. RHYNCHOSIA. Calyx 4-cleft, somewhat 2-lipped, or 4-parted. Pod 1-2-seeded.

+ + Ovary several-ovuled. Leaflets usually stipellate. Flowers not yellow.

25. GALACTIA. Calyx 2-bracteolate, 4-cleft, the upper lobe broadest and entire. Bracts deciduous.

26. AMPHICARPÆA. Calyx not bracteolate, 4-5-toothed. Peduncles many-flowered. Bracts persistent.

27. CLITORIA. Calyx 2-bracteolate, tubular, 5-cleft. Peduncles 1-3-flowered.

28. CENTROSEMA. Calyx 2-bracteolate, short, 5-cleft. Peduncles few-flowered. Standard with a spur at its base.

TRIBE V. **SOPHOREÆ** and **PODALYRIEÆ.** Stamens 10, distinct.

29. BAPTISIA. Calyx 4-5-lobed. Keel-petals distinct. Pod inflated. Herbs. Leaves palmately 3-foliolate or simple.

30. CLADRASTIS. Calyx 5-toothed. Keel-petals distinct. Pod very flat. Tree, with pinnate leaves.

SUBORDER II. CÆSALPINIEÆ. THE BRASILETTO FAMILY.

Corolla imperfectly or not at all papilionaceous, sometimes nearly regular, imbricated in the bud, the upper or odd petal inside and enclosed by the others. Stamens 10 or fewer, commonly distinct, inserted on the calyx. Seeds anatropous. Embryo usually straight.

* Flowers imperfectly papilionaceous, perfect.

31. CERCIS. Calyx campanulate, 5-toothed. Pod flat, wing-margined. Leaves simple.

* * Flowers not papilionaceous, perfect.

32. CASSIA. Calyx of 5 nearly distinct sepals. Leaves simply pinnate.

* * * Flowers not at all papilionaceous, not perfect.

33. GYMNOCLADUS. Flowers diœcious. Petals 5, regular, inserted on the summit of the tubular-funnel-form calyx. Stamens 10. Leaves doubly pinnate.

34. GLEDITSCHIA. Flowers polygamous. Petals, divisions of the open calyx, and stamens 3-5. Leaves 1-2-pinnate.

SUBORDER III. MIMOSEÆ. THE MIMOSA FAMILY.

Corolla valvate in æstivation, often united into a 4–5-lobed cup, hypogynous, as are the (often very numerous) stamens, regular. Embryo straight. Leaves twice or thrice pinnate.

85. DESMANTHUS. Petals distinct. Stamens 5–10. Pod smooth.
86. SCHRANKIA. Petals united below into a cup. Stamens 8 or 10. Pod covered with small prickles or rough projections.

SUBORDER I. PAPILIONÀCEÆ. THE PROPER PULSE FAMILY.

1. LUPÌNUS, Tourn. LUPINE.

Calyx very deeply 2-lipped. Sides of the standard reflexed: keel scythe-shaped, pointed. Sheath of the monadelphous stamens entire: anthers alternately oblong and roundish. Pod oblong, flattened, often knotty by constrictions between the seeds. Cotyledons thick and fleshy. Herbs, with palmately 1–15-foliolate leaves, and showy flowers in terminal racemes or spikes. (Name from *Lupus*, a wolf, because these plants were thought to devour the fertility of the soil.)

1. **L. perénnis,** L. (WILD LUPINE.) Somewhat hairy; stem erect (1°–2°); leaflets 7–11, oblanceolate; flowers in a long and loose raceme; pods very hairy. ♃ — Sandy soil, common. June. — Flowers showy, purplish-blue, rarely pale or white. — Some S. European Lupines in gardens, and others from Oregon have recently been introduced, especially *L. polyphýllus.*

2. CROTALÀRIA, L. RATTLE-BOX.

Calyx 5-cleft, scarcely 2-lipped. Standard large, heart-shaped: keel scythe-shaped. Sheath of the monadelphous stamens cleft on the upper side: 5 of the anthers smaller and roundish. Pod inflated, oblong, many-seeded. — Herbs with simple leaves. Flowers racemed, yellow. (Name from κρόταλον, *a rattle;* the loose seeds rattling in the coriaceous inflated pods.)

1. **C. sagittàlis,** L. Annual, hairy (3′–6′ high); leaves oval or oblong-lanceolate, scarcely petioled; stipules united and decurrent on the stem, so as to be inversely arrow-shaped; peduncles few-flowered; corolla not longer than the calyx. — Sandy soil, Massachusetts to Virginia near the coast, and southward. July.

3. GENÍSTA, L. WOAD-WAXEN. WHIN.

Calyx 2-lipped. Standard oblong-oval, spreading: keel oblong, straight, scarcely enclosing the stamens and style. Stamens monadelphous, the sheath entire; 5 alternate anthers shorter. Pod flat, several-seeded. — Shrubby plants, with simple leaves, and yellow flowers. (Name from the Celtic *gen,* a bush.)

1. **G.** TINCTÒRIA, L. (DYER'S GREEN-WEED.) Low, not thorny, with striate-angled erect branches; leaves lanceolate; flowers in spiked racemes. —

Peekskill, New York, and E. Massachusetts, where it is thoroughly established on sterile hills in Essex County. June. (Adv. from Eu.)

4. TRIFÒLIUM, L. CLOVER. TREFOIL.

Calyx persistent, 5-cleft, the teeth bristle-form. Corolla withering or persistent: standard longer than the wings, these mostly longer than the keel, and united with it by their slender claws. Stamens more or less united with the corolla. Pods small and membranous, often included in the calyx, 1–6-seeded, indehiscent, or opening by one of the sutures. — Tufted or diffuse herbs. Leaves mostly palmately 3-foliolate: leaflets often toothed. Stipules united with the petioles. Flowers chiefly in heads or spikes. (Name from *tres*, three, and *folium*, a leaf.)

* *Flowers sessile in dense heads: corolla purple or purplish, withering away after flowering, tubular below, the petals more or less coherent with each other.*

+- *Calyx-teeth silky-plumose, longer than the whitish corolla.*

1. T. ARVÉNSE, L. (RABBIT-FOOT CLOVER. STONE CLOVER.) Silky, branching (5′–10′ high); leaflets oblanceolate; heads becoming very soft-silky and grayish, oblong or cylindrical. ① — Old fields, &c. (Nat. from Eu.)

+- +- *Calyx almost glabrous, except a bearded ring in the throat, shorter than the rose-red or purple elongated-tubular corolla. (Flowers sweet-scented.)*

2. T. PRATÉNSE, L. (RED CLOVER.) Stems ascending, somewhat hairy; *leaflets oval or obovate, often notched* at the end and marked on the upper side with a pale spot; *stipules broad, bristle-pointed; heads ovate, sessile.* ② ♃ — Fields and meadows; largely cultivated. (Adv. from Eu.)

3. T. MÈDIUM, L. (ZIGZAG CLOVER.) Stems zigzag, smoothish; *leaflets oblong, entire,* and spotless; *heads mostly stalked;* flowers deeper purple and larger: otherwise like the last. ♃ — Dry hills, Essex Co., Massachusetts. (Adv. from Eu.)

* * *Flowers pedicelled in umbel-like round heads on a naked peduncle, their short pedicels reflexed when old: corolla white or rose-color, withering-persistent and turning brownish in fading; the tubular portion short.*

4. **T. refléxum,** L. (BUFFALO CLOVER.) *Stems ascending, downy; leaflets obovate-oblong,* finely toothed; stipules thin, ovate; calyx-teeth hairy; pods 3–5-seeded. ① ② — Western New York (rare) to Kentucky and southward. — Heads and flowers larger than in No. 2: standard rose-red; wings and keel whitish.

5. **T. stoloniferum,** Muhl. (RUNNING BUFFALO-CLOVER.) Smooth; *stems with long runners* from the base; *leaflets broadly obovate or obcordate,* minutely toothed; heads loose; pods 2-seeded. ♃ — Open woodlands and prairies, Ohio to Illinois, Kentucky, and westward. — Flowers white, tinged with purple, as large as No. 4, which this too closely resembles.

6. **T. rèpens,** L. (WHITE CLOVER.) Smooth; the slender *stems spreading and creeping; leaflets inversely heart-shaped* or merely notched, obscurely toothed; stipules scale-like, narrow; petioles and especially the peduncles very long; heads small and loose; pods about 4-seeded. ♃ — Pastures, waste

places, and even in woodlands. Appearing like a naturalized plant; but manifestly indigenous northward. (Eu.)

* * * *Flowers short-pedicelled in close heads, reflexed when old: corolla yellow, persistent, turning dry and chestnut-brown with age, the standard becoming hood-shaped.*

7. **T.** AGRÀRIUM, L. (YELLOW or HOP-CLOVER.) Smoothish, somewhat upright (6′–12′ high); *leaflets obovate-oblong, all three from the same point* (palmate) and nearly sessile; *stipules narrow, cohering with the petiole for more than half its length.* ① — Sandy fields, Massachusetts to Penn. (Nat. from Eu.)

8. **T.** PROCÚMBENS, L. (LOW HOP-CLOVER.) Stems spreading or ascending, pubescent (3′–6′ high); *leaflets wedge-obovate,* notched at the end; *the lateral at a small distance from the other* (pinnately 3-foliolate); *stipules ovate, short.* ① — Sandy fields and road-sides, N. England to Virginia. Also var. MÌNUS (T. minus, *Relh.*), with smaller heads, the standard not much striate with age. With the other, and Kentucky, in cultivated grounds. (Nat. from Eu.)

5. MELILÒTUS, Tourn. MELILOT. SWEET CLOVER.

Flowers much as in Clover, but in spiked racemes, small: corolla deciduous, the wings not united with the keel. Pod ovoid, coriaceous, wrinkled, longer than the calyx, scarcely dehiscent, 1–2-seeded. — Herbs, fragrant in drying, with pinnately 3-foliolate leaves; leaflets toothed. (Name from *μέλι, honey,* and λωτός, some leguminous plant.)

1. **M.** OFFICINÀLIS, Willd. (YELLOW MELILOT.) Upright (2°–4° high); leaflets obovate-oblong, obtuse; *corolla yellow;* the petals nearly of equal length. ② — Waste or cultivated grounds. (Adv. from Eu.)

2. **M.** ÀLBA, Lam. (WHITE MELILOT.) Leaflets truncate; *corolla white,* the standard longer than the other petals. ② (M. leucántha, *Koch.*) — In similar places to the last, and much like it. (Adv. from Eu.)

6. MEDICÀGO, L. MEDICK.

Flowers nearly as in Melilotus. Pod 1–several-seeded, scythe-shaped, curved, or variously coiled. — Leaves pinnately 3-foliolate. Stipules often cut. (Deriv. from Μηδική, the name applied to Lucerne, because it came to the Greeks from Media.)

1. **M.** SATÌVA, L. (LUCERNE.) Upright, smooth; leaflets obovate-oblong, toothed; *flowers* (*purple*) *racemed;* pods spirally twisted. ♃ — Cultivated for green fodder, rarely spontaneous. (Adv. from Eu.)

2. **M.** LUPULÌNA, L. (BLACK MEDICK. NONESUCH.) Procumbent, pubescent; leaflets wedge-obovate, toothed at the apex; *flowers in short spikes* (yellow); *pods kidney-form,* 1-seeded. ② — Waste places; sparingly. (Adv. from Eu.)

3. M. MACULÀTA, Willd. (SPOTTED MEDICK.) Spreading or procumbent, somewhat pubescent; leaflets obcordate, with a purple spot, minutely

toothed; *peduncles 3–5-flowered;* flowers yellow; *pods compactly spiral,* of 2 or 3 turns, compressed, *furrowed on the thick edge,* and fringed with a double row of curved prickles. ①—Introduced with wool into waste grounds in some places. (Adv. from Eu.)

4. M. DENTICULÀTA, Willd. Nearly glabrous; *pods loosely spiral, deeply reticulated,* and with a *thin keeled edge:* otherwise like the last.—Sparingly introduced into New England, &c. (Adv. from Eu.)

7. PSORÀLEA, L. PSORALEA.

Calyx 5-cleft, persistent, the lower lobe longest. Stamens diadelphous or sometimes monadelphous: the 5 alternate anthers often imperfect. Pod seldom longer than the calyx, thick, often wrinkled, indehiscent, 1-seeded.—Perennial herbs, usually sprinkled all over or roughened (especially the calyx, pods, &c.) with glandular dots or points. Leaves mostly 3–5-foliolate. Stipules cohering with the petiole. Flowers spiked or racemed, white or mostly blue-purplish. Root sometimes tuberous and farinaceous. (Name from ψωραλέος, *scurfy,* from the glands or dots.)

* *Leaves pinnately 3-foliolate.*

1. **P. Onóbrychis,** Nutt. Nearly smooth and free from glands, *erect* (3°–5° high); *leaflets lanceolate-ovate, taper-pointed* (3′ long); *stipules and bracts awl-shaped;* racemes axillary, elongated; peduncle shorter than the leaves; pods roughened and wrinkled.—River-banks, Ohio and southwestward. July.—Flowers very small.

2. **P. stipulàta,** Torr. & Gray. Nearly smooth and glandless; *stems diffuse; leaflets ovate-elliptical,* reticulated; *stipules ovate; flowers in heads* on axillary rather short peduncles; *bracts broadly ovate, sharp-pointed.*—Rocks, Falls of the Ohio, Kentucky. June.

3. **P. melilotoìdes,** Michx. Somewhat pubescent, more or less glandular; *stems erect* (1°–2° high), slender; *leaflets lanceolate or narrowly oblong; spikes oblong,* long-peduncled; *stipules awl-shaped;* bracts ovate or lanceolate, taper-pointed; pods strongly wrinkled transversely. (Also P. eglandulosa, *Ell.*)—Dry soil, Ohio to Illinois, Virginia, and southward. June.

* * *Leaves palmately 3–5-foliolate.*

4. **P. floribúnda,** Nutt. Slender, erect, much branched and bushy (2°–4° high), *minutely hoary-pubescent* when young; leaflets varying from linear to obovate-oblong (½′–1½′ long), glandular-dotted; *racemes panicled;* lobes of the calyx and bracts ovate, acute; pod glandular.—Prairies of Illinois and southwestward. June–Sept.—Flowers 2″ or 3″ long.

5. **P. argophýlla,** Pursh. *Silvery silky-white* all over, erect, divergently branched (1°–3° high); leaflets elliptical-lanceolate; *spikes interrupted;* lobes of the calyx and bracts lanceolate.—High plains, Falls of St. Anthony, Wisconsin? and westward. June.—Flowers 4″–5″ long.

P. ESCULÉNTA, Pursh., of the same region as the last,—the INDIAN TURNIP, POMME BLANCHE, or POMME DE PRAIRIE, used as food by the aborigines,—may possibly occur on the Wisconsin side of the Mississippi.

8. DÀLEA, L. DALEA.

Calyx 5-cleft or toothed. Corolla imperfectly papilionaceous: petals all on claws: the standard heart-shaped, inserted in the bottom of the calyx: the keel and wings borne on the middle of the monadelphous sheath of filaments, which is cleft down one side. Stamens 10, rarely 9. Pod membranaceous, 1-seeded, indehiscent, enclosed in the persistent calyx. — Mostly herbs, more or less dotted with glands, with minute stipules, the flowers in terminal spikes or heads. (Named for *Thomas Dale*, an English botanist.)

1. **D. alopecuroìdes,** Willd. Erect (1° - 2° high), glabrous, except the dense and cylindrical silky-villous spike; leaves pinnate, of many linear-oblong leaflets; corolla small, whitish. ① — Alluvial soil, Illinois and southward. July. (Numerous species occur farther southwest.)

9. PETALOSTÈMON, Michx. PRAIRIE CLOVER.

Calyx 5-toothed. Corolla indistinctly papilionaceous: petals all on thread-shaped claws, 4 of them nearly similar and spreading, borne on the top of the monadelphous and cleft sheath of filaments, alternate with the 5 anthers; the fifth (standard) inserted in the bottom of the calyx, heart-shaped or oblong. Pod membranaceous, enclosed in the calyx, indehiscent, 1-seeded. — Chiefly perennial herbs, upright, dotted with glands, with crowded odd-pinnate leaves, minute stipules, and small flowers in very dense terminal and peduncled heads or spikes. (Name combined of the two Greek words for petal and stamen, alluding to the peculiar union of these organs in this genus.)

1. **P. violàceum,** Michx. Smoothish; leaflets 5, narrowly linear; heads globose-ovate, or oblong-cylindrical when old; bracts pointed, not longer than the silky-hoary calyx; *corolla rose-purple.* — Dry prairies, Michigan, Wisconsin, and southward. July.

2. **P. cándidum,** Michx. Smooth; leaflets 7 - 9, lanceolate or linear-oblong; heads oblong, when old cylindrical; bracts awned, longer than the nearly glabrous calyx; *corolla white.* — Wisconsin to Kentucky and westward. July.

10. AMÓRPHA, L. FALSE INDIGO.

Calyx inversely conical, 5-toothed, persistent. Standard concave, erect: the other petals entirely wanting! Stamens 10, monadelphous at the very base, otherwise distinct. Pod oblong, longer than the calyx, 1 - 2-seeded, roughened, tardily dehiscent. — Shrubs, with odd-pinnate leaves; the leaflets marked with minute dots, usually stipellate. Flowers violet, crowded in clustered terminal spikes. (Name, ἄμορφη, *wanting form,* from the absence of 4 of the petals.)

1. **A. fruticòsa,** L. (FALSE INDIGO.) *Rather pubescent or smoothish;* leaflets 8 - 12 pairs, oval, scattered; pods 2-seeded. — River-banks, S. Penn. to Wisconsin and southward. June. — A tall shrub: very variable.

2. **A. canéscens,** Nutt. (LEAD-PLANT.) Low (1° - 3° high), *whitened with hoary down;* leaflets 15 - 25 pairs, elliptical, crowded, small, the upper

surface smoothish with age; pods 1-seeded.—Prairies and crevices of rocks, Michigan to Wisconsin and southwestward. July.—Supposed to indicate the presence of lead-ore.

11. ROBINIA, L. LOCUST-TREE.

Calyx short, 5-toothed, slightly 2-lipped. Standard large and rounded, turned back, scarcely longer than the wings and keel. Stamens diadelphous. Pod linear, flat, several-seeded, margined on the seed-bearing edge, at length 2-valved.—Trees or shrubs, often with prickly spines for stipules. Leaves odd-pinnate, the ovate or oblong leaflets stipellate. Flowers showy, in hanging axillary racemes. Base of the leaf-stalks covering the buds of the next year. (Named in honor of *John Robin*, herbalist to Henry IV. of France, and his son *Vespasian Robin*, who first cultivated the Locust-tree in Europe.)

1. **R. Pseudacàcia,** L. (COMMON LOCUST, or FALSE ACACIA.) Branches naked; *racemes slender, loose;* flowers white, fragrant; pod smooth.—S. Penn. and southward along the mountains: commonly cultivated as an ornamental tree, and for its invaluable timber: naturalized in some places. June.

2. **R. viscòsa,** Vent. (CLAMMY LOCUST.) *Branchlets and leafstalks clammy; flowers crowded in oblong racemes,* tinged with rose-color, nearly inodorous; pod glandular-hispid.—S. W. Virginia and southward. Cultivated, like the last, a smaller tree. June.

3. **R. hispida,** L. (BRISTLY or ROSE ACACIA.) *Branchlets and stalks bristly;* flowers large and deep rose-color, inodorous; pods glandular-hispid.—Varies with less bristly or nearly naked branchlets; also with smaller flowers, &c.—Mountains of S. Virginia and southward: commonly cultivated. May, June.—Shrubs 3° - 8° high.

12. WISTARIA, Nutt. WISTARIA.

Calyx campanulate, somewhat 2-lipped; upper lip of 2 short teeth, the lower of 3 longer ones. Standard roundish, large, turned back, with 2 callosities at its base: keel scythe-shaped: wings doubly auricled at the base. Stamens diadelphous. Pod elongated, thickish, nearly terete, knobby, stipitate, many-seeded, at length 2-valved. Seeds kidney-shaped, large. A twining shrubby plant, with minute stipules, pinnate leaves of 9 - 13 ovate-lanceolate leaflets, not stipellate, and dense racemes of large and showy lilac-purple flowers. (Dedicated to the late *Professor Wistar*, of Philadelphia.)

1. **W. frutéscens,** DC.—Rich alluvial soil, Virginia to Illinois and southward. Sometimes cultivated for ornament. May.

13. TEPHRÒSIA, Pers. HOARY PEA.

Calyx about equally 5-cleft. Standard roundish, usually silky outside, turned back, scarcely longer than the coherent wings and keel. Stamens monadelphous or diadelphous. Pod linear, flat, several-seeded, 2-valved.—Hoary perennial herbs, with odd-pinnate leaves, and white or purplish racemed flowers. Leaflets mucronate, veiny. (Name from τεφρός, *ash-colored* or *hoary*.)

1. **T. Virginiàna,** Pers. (GOAT'S RUE. CATGUT.) *Silky-villous* with whitish hairs when young; *stem erect and simple* (1° – 2° high), *leafy* to the top; leaflets 17 – 29, linear-oblong; flowers large and numerous, clustered in a terminal *oblong dense raceme or panicle,* yellowish-white marked with purple. — Dry sandy soil. June, July. — Roots long and slender, very tough. Flower almost as large as a pea-blossom.

2. **T. spicàta,** Torr. & Gray. *Villous with rusty hairs;* stems branched below, straggling or ascending (2° long), *few-leaved;* leaflets 9 – 15, obovate or oblong-wedge-shaped, often notched at the end; *flowers few,* in a loose interrupted spike raised on a *very long peduncle,* reddish. — Dry soil, E. Virginia and southward. July.

3. **T. hispidula,** Pursh. Hairy with some long and rusty or only minute and appressed pubescence; stems slender (9′ – 24′ long), divergently branched, straggling; leaflets 5 – 15, oblong, varying to obovate-wedge-shaped and oblanceolate; *peduncles longer than the leaves,* 2 – 4 *flowered;* flowers reddish-purple. — Dry sandy soil, Virginia and southward.

14. ASTRAGÀLUS, L. MILK-VETCH.

Calyx 5-toothed. Corolla usually long and narrow: standard small, equalling or exceeding the wings and blunt keel, its sides reflexed or spreading. Stamens diadelphous. Pod several – many-seeded, various, mostly turgid, one or both sutures usually projecting into the cell, either slightly or to such a degree as to divide the cavity lengthwise into two. Seed-stalks slender. — Chiefly herbs, with odd-pinnate leaves and spiked or racemed flowers. (The ancient Greek name of a leguminous plant, as also of the ankle-bone; but the connection between the two is past all guess.)

§ 1. *Pod very thick and juicy when fresh, globular, resembling a plum, 2-celled, indehiscent, or tardily separable through the partition into 2 closed portions.*

1. **A. caryocárpus,** Ker. (GROUND PLUM.) Pale and minutely appressed-pubescent; stems low, decumbent; leaflets numerous, narrowly oblong; flowers in a short spike-like raceme; *corolla violet-purple; fruit glabrous, ovate-globular, more or less pointed,* about ¾′ in diameter. ♃ — Dry soil, on the Mississippi River, at the junction of the St. Peter's, and westward and southward. May.

2. **A. Mexicànus,** A. DC. Smoother, or pubescent with looser hairs, larger; stems usually ascending; leaflets roundish, obovate, or oblong; flowers larger (10″ – 12″ long); calyx softly hairy; *corolla cream-color, bluish only at the tip; fruit globular, very obtuse* and pointless, 1′ or more in diameter: otherwise like the last: — the unripe fruits of both are edible, and are eaten, raw or cooked, by travellers. (A. trichocalyx, *Nutt.*) — Prairies and open plains, from Illinois opposite St. Louis westward and southward.

§ 2. *Pod dry and dehiscent, partly or completely 2-celled by the turning inward of the dorsal suture.*

3. **A. Canadénsis,** L. Tall and erect (1° – 4° high), somewhat pubescent; leaflets 21 – 27, oblong; flowers greenish cream-color, very numerous, in

long and close spikes (4′–9′); pods ovoid-oblong, coriaceous, completely 2-celled. ♃ — River-banks, common from N. New York westward. July – Aug.

4. **A. distórtus,** Torr. & Gray. Low and spreading, branched from the base, smoothish; leaflets 11–23, oblong or obovate; flowers purplish or violet, 10–20 in a short spike, the standard deeply notched at the summit; pods oblong, turgid, incurved (¾′ long), coriaceous, incompletely 2-celled. ♃ — Mason Co., Illinois, *Dr. Mead.* May. (Also in Arkansas and Texas.)

§ 3. *Pod dry and dehiscent, 1-celled, or incompletely 2-celled by the projection of the ventral (seed-bearing) suture.* (Phaca, *L.*, *DC.*)

5. **A. Coòperi.** Nearly smooth, erect; leaflets 11–21, elliptical or oblong, somewhat notched at the end, minutely hoary underneath; *peduncles about the length of the leaves; flowers white; pods not stalked in the calyx, globose-ovoid, inflated,* thinnish (¾′ long), *pointed, grooved at the two sutures,* which are both turned inwards, but especially the inner. ♃ (Phaca neglecta, *Torr. & Gray.*) — Gravelly banks of rivers, &c., W. New York to Wisconsin. June, July. — Plant 1°–2° high, greener and less coarse than A. Canadensis, with pure white flowers in shorter and more open spikes: calyx shorter. (Named for *William Cooper, Esq.*, the discoverer: there being an A. neglectus.)

6. **A. Robbínsii.** Nearly smooth and erect (1° high); slender; leaflets 7–11, elliptical, often notched; *peduncles much longer than the leaves;* raceme loose, nearly 1-sided in fruit; flowers white (4″ long); *pods hanging, stalked in the calyx, oblong, boat-shaped, obtuse,* the seed-bearing suture convex, the other nearly straight. (Phaca Robbinsii, *Oakes.*) — Rocky ledges of the Onion River, near Burlington, Vermont, *Dr. Robbins* (1829). Willoughby Mountain, *Mr. Blake.* June. — Pods 6″–7″ long, 1-celled, papery and veiny, smooth, the outer suture often slightly turned inwards.

15. ÆSCHYNÓMENE, L. SENSITIVE JOINT VETCH.

Calyx 2-lipped; the upper lip 2-, the lower 3-cleft. Standard roundish: keel boat-shaped. Stamens diadelphous in two sets of 5 each. Pod flattened, composed of several square easily separable joints. — Leaves odd-pinnate, with several pairs of leaflets, sometimes sensitive, as if shrinking from the touch (whence the name, from *αἰσχυνομένη, being ashamed*).

1. **Æ. híspida,** Willd. Erect, rough-bristly; leaflets 37–51, linear; racemes 3–5-flowered; pod stalked, 6–10-jointed. ① — Along rivers, S. Penn., Virginia, and southward. Aug. — Flowers yellow, reddish externally.

16. HEDÝSARUM, Tourn. HEDYSARUM.

Calyx 5-cleft, the lobes awl-shaped and nearly equal. Keel nearly straight, obliquely truncate, not appendaged, longer than the wings. Stamens diadelphous, 9 & 1. Pod flattened, composed of several equal-sided separable roundish joints connected in the middle. — Leaves odd-pinnate. (Name composed of *ἡδύς, sweet,* and *ἄρωμα, smell.*)

1. **H. boreàle,** Nutt. Leaflets 13–21, oblong or lanceolate, nearly glabrous; stipules scaly, united opposite the petiole, raceme of many deflexed

purple flowers; standard shorter than the keel; joints of the pod 3 or 4, smooth, reticulated. ♃ — Mountain above Willoughby Lake, Vermont, *Wood.* (Alleghany Mountains, *Michaux.*) Also northward.

17. DESMÒDIUM, DC. Tick-Trefoil.

Calyx usually more or less 2-lipped. Standard obovate: wings adherent to the straight or straightish and usually truncate keel, by means of a little transverse appendage on each side of the latter. Stamens diadelphous, 9 & 1, or monadelphous below. Pod flat, deeply lobed on the lower margin, separating into few or many flat reticulated joints (mostly roughened with minute hooked hairs by which they adhere to the fleece of animals or to clothing). — Perennial herbs, with pinnately 3-foliolate (rarely 1-foliolate) leaves, stipellate. Flowers in axillary or terminal racemes, often panicled, and 2 or 3 from each bract, purple or purplish, often turning green in withering. Stipules and bracts scale-like, often striate. (Name from δεσμός, *a bond or chain,* from the connected joints of the pods.)

§ 1. *Pod raised on a stalk (stipe) many times longer than the slightly toothed calyx and nearly as long as the pedicel, straightish on the upper margin, deeply sinuate on the lower; the 1 – 4 joints mostly half-obovate, concave on the back: stamens monadelphous below: plants nearly glabrous: stems erect or ascending: raceme terminal, panicled: stipules bristle-form, deciduous.*

1. **D. nudiflòrum,** DC. *Leaves all crowded at the summit of the sterile stems;* leaflets broadly ovate, bluntish, whitish beneath; *raceme elongated, on a prolonged ascending leafless stalk or scape from the root,* 2° long. — Dry woods; common. Aug.

2. **D. acuminàtum,** DC. *Leaves all crowded at the summit of the stem, from which arises the elongated naked raceme or panicle;* leaflets round-ovate, taper-pointed, green both sides, the end one round (4′ – 5′ long). — Rich woods. July.

3. **D. pauciflòrum,** DC. *Leaves scattered* along the low (8′ – 15′ high) ascending stems; leaflets rhombic-ovate, bluntish, pale beneath; *raceme few-flowered,* terminal. — Woods, W. New York and Penn. to Illinois, and south-westward. Aug.

§ 2. *Pod short-stalked, of 3 – 5 joints: calyx-teeth longer than the tube: stipules ovate, striate, pointed, persistent: stems prostrate: racemes axillary and terminal, small, scarcely panicled.*

4. **D. humifùsum,** Beck. *Smoothish;* leaflets ovate or oval; *stipules ovate-lanceolate;* pods slightly sinuate along the upper margin, the joints obtusely triangular. — Woods, E. Massachusetts and Pennsylvania, rare. Aug. — Resembles the next.

5. **D. rotundifòlium,** DC. *Hairy all over;* leaflets orbicular, or the odd one slightly rhomboid; *stipules large, broadly ovate;* pods almost equally sinuate on both edges; the joints rhomboid-oval. — Dry rocky woods. Aug.

§ 3 *Pod slightly if at all stalked in the calyx; the teeth of the latter longer than the tube: racemes panicled.*

* *Stems tall and erect; the persistent stipules and (deciduous) bracts large and conspicuous, ovate or ovate-lanceolate, taper-pointed: pods of* 4 – 7 *unequal-sided rhombic joints, which are considerably longer than broad, about* ⅓′ *long.* (*Flowers rather large.*)

6. **D. canéscens,** DC. Stem loosely branched (3° – 5° high), *hairy; leaflets ovate, bluntish, about the length of the petioles, whitish and reticulated beneath,* both sides roughish with a close-pressed fine pubescence; joints of the pod very adhesive. — Moist grounds, Vermont to Michigan, Illinois, and southward. Aug. — Branches clothed with minute and hooked, and long spreading rather glutinous hairs.

7. **D. cuspidàtum,** Torr. & Gray. *Very smooth throughout;* stem straight; *leaflets lanceolate-ovate and taper-pointed,* green both sides; longer than the petiole (3′ – 5′); joints of the pod rhomboid-oblong, smoothish. — Thickets. July. — The conspicuous bracts and stipules ½′ long.

* * *Stems* (2° – 5° *high*) *erect: stipules as well as the bracts mostly deciduous, small and inconspicuous: pods of* 3 – 5 *triangular or half-rhombic or very unequal-sided rhomboidal joints, which are longer than broad,* ¼′ *or less in length.* (*Flowers middle-sized.*)

8. **D. lævigàtum,** DC. *Smooth* or nearly so throughout; stem straight; *leaflets ovate,* bluntish, pale beneath (2′ – 3′ long); panicles minutely rough-pubescent. — Pine woods, New Jersey and southward.

9. **D. viridiflòrum,** Beck. Stem *very downy,* rough at the summit; *leaflets broadly ovate,* very obtuse, rough above, *whitened with a soft velvety down underneath* (2′ – 3′ long). — S. New York and southward. Aug.

10. **D. Dillènii,** Darlingt. Stem pubescent; *leaflets oblong or oblong-ovate,* commonly bluntish, pale beneath, *softly and finely pubescent* (mostly thin, 2′ – 3′ long). — Open woodlands, common. Aug.

11. **D. paniculàtum,** DC. *Nearly smooth* throughout; stem slender; *leaflets oblong-lanceolate, or narrowly lanceolate, tapering to a blunt point, thin* (3′ – 5′ long); racemes much panicled. — Copses, common. July.

12. **D. strictum,** DC. *Smooth;* stem very straight and slender, simple; *leaflets linear, blunt, strongly reticulated, thickish* (1′ – 2′ long, ¼′ wide); panicle wand-like; joints of the pod 1 – 3, semi-obovate or very gibbous (only 2″ long). — Pine woods of New Jersey, and southward. Aug.

* * * *Stipules small and inconspicuous, mostly deciduous: pods of few roundish or obliquely oval or sometimes roundish-rhomboidal joints,* 1½″ *to* 2½″ *long.*

← *Stems erect: bracts before flowering conspicuous: racemes densely flowered.*

13. **D. Canadénse,** DC. Stem hairy (3° – 6° high); *leaflets oblong-lanceolate,* or ovate-lanceolate, obtuse, with numerous straightish veins, *much longer than the petiole* (1½′ – 3′ long); *flowers showy,* larger than in any other species (⅓′ – ½′ long). — Dry, rich woods, common, especially northward. Aug.

14. **D. sessilifòlium,** Torr. & Gray. Stem pubescent (2° – 4° high); *leaves nearly sessile; leaflets linear* or linear-oblong, blunt, thickish, reticulated, rough above, downy beneath; branches of the panicle long; *flowers small.* — Copses, Ohio and Michigan to Illinois and southward. Aug.

+ + *Stems ascending* (1°-3° *high*): *bracts small; racemes or panicles elongated and loosely flowered: flowers small.*

15. **D. rigidum,** DC. Stem branching, *somewhat hoary,* like the lower surface of the leaves, with a close roughish pubescence; *leaflets ovate-oblong,* blunt, thickish, reticulated-veiny, rather rough above, *the lateral ones longer than the petiole.* — Dry hill-sides, Mass. to Michigan, Illinois, and southward. Aug. — Intermediate, as it were, between No. 16 and No. 10.

16. **D. ciliàre,** DC. Stem slender, *hairy or rough-pubescent; leaves crowded, on very short hairy petioles; leaflets round-ovate or oval,* thickish, more or less hairy on the margins and underneath (½′-1′ long). — Dry hills and sandy fields; common, especially southward. Aug.

17. **D. Marilándicum,** Boott. *Nearly smooth* throughout, slender; *leaflets ovate or roundish,* very obtuse, thin, *the lateral ones about the length of the slender petiole:* otherwise as No. 16. (D. obtùsum, DC.) — Copses, common July - Sept.

+ + + *Stems reclining or prostrate: racemes loosely flowered.*

18. **D. lineàtum,** DC. Stem minutely pubescent, striate-angled; leaflets orbicular, smoothish (½′-1′ long), much longer than the petiole; pod not stalked. — Virginia and southward.

18. LESPEDÈZA, Michx. BUSH-CLOVER.

Calyx 5-cleft, the lobes nearly equal, slender. Stamens diadelphous (9 & 1): anthers all alike. Pods of a single 1-seeded joint (sometimes 2-jointed, with the lower joint empty and stalk-like), oval or roundish, flat, reticulated. — Perennials with pinnately 3-foliolate leaves, not stipellate. Stipules and bracts minute. Flowers often polygamous. (Dedicated to *Lespedez,* the Spanish governor of Florida when Michaux visited it.)

* *Flowers of two sorts, the larger (violet-purple) perfect, but seldom fruitful, panicled or clustered; with smaller pistillate and fertile but mostly apetalous ones intermixed, or in subsessile little clusters.*

1. **L. procúmbens,** Michx. *Soft-downy,* except the upper surface of the leaves, trailing, slender; leaflets oval or elliptical; peduncles slender, mostly simple, few-flowered. — Sandy soil, commonest southward. Aug. — The apetalous fertile flowers, as in the rest, have short hooked styles.

2. **L. rèpens,** Torr. & Gray. *Smooth, except minute close-pressed scattered hairs, prostrate,* spreading, very slender; leaflets oval or obovate-elliptical (½′ long); peduncles slender and few-flowered; pods roundish. — Dry sandy soil, S. New York to Kentucky and southward. — Much like the last.

3. **L. violàcea,** Pers. *Stems upright or spreading,* branched; leaflets varying from oval-oblong to linear, whitish-downy beneath with close-pressed pubescence; *peduncles or clusters few-flowered;* pods ovate. — The principal varieties are, 1. DIVÉRGENS, with oval or oblong leaflets and loosely panicled flowers; this runs into, 2. SESSILIFLÒRA, with the flowers principally on peduncles much shorter than the leaves, and clustered; and a more distinct form is, 3. ANGUSTIFÒLIA, with closely clustered flowers on straight branches,

crowded leaves, and narrowly oblong or linear leaflets, which are often silky.— Dry copses, common. Aug. - Sept. — Pods ripening from both sorts of flowers.

4. **L. Stùvei,** Nutt. *Stems upright-spreading,* bushy, *downy;* leaflets oval or roundish, longer than the petiole, silky or white-woolly beneath (and sometimes above); *clusters many-flowered, crowded;* pods ovate, downy. — Dry hills, and sand, Plymouth, Mass. to Virginia, Michigan, and southward. — Appearing intermediate between No. 3 and No. 5.

* * *Flowers all alike and perfect, in close spikes or heads: corolla whitish or cream-color with a purple spot on the standard, about the length of the downy calyx: stems upright, wand-like* (2° - 4° *high*).

5. **L. hírta,** Ell. *Peduncles longer than the leaves; petioles slender;* leaflets roundish or oval, hairy; *spikes cylindrical, rather loose;* pods nearly as long as the calyx. (L. polystàchia, *Michx.*) — Dry hill-sides. Aug., Sept.

6. **L. capitàta,** Michx. *Peduncles and petioles short;* leaflets elliptical or oblong, thickish, reticulated and mostly smooth above, silky beneath; *spikes or heads short;* pods much shorter than the calyx. — Varies greatly, most of all in var. ANGUSTIFÒLIA: slender; leaflets linear; peduncles sometimes elongated. — Dry and sandy soil; the narrow variety only found near the coast and southward. Sept. — Stems woolly, rigid.

19. STYLOSÁNTHES, Swartz. PENCIL-FLOWER.

Flowers of two kinds intermixed in the clusters; one sort complete but unfruitful; the other fertile, and consisting only of a pistil between 2 bractlets. — Calyx with a slender tube like a stalk, 2-lipped at the summit; upper lip 2-, the lower 3-cleft. Stamens monadelphous: 5 of the anthers linear, the 5 alternate ones ovate. Fertile flowers with a hooked style. Pod reticulated, 1 - 2-jointed; the lower joint when present empty and stalk-like, the upper ovate. — Low perennials, branched from the base, with pinnately 3-foliolate leaves; the stipules united with the petiole. (Name composed of *στύλος*; *a column*, and *ἄνθος*, *a flower*, from the stalk-like calyx-tube.)

1. **S. elàtior,** Swartz. Tufted, low, often bristly, wiry; leaflets lanceolate, strongly straight-veined; heads or clusters small and few-flowered. — Pine barrens, Long Island to Virginia and southward. July - Oct. — Flowers small, yellow.

20. VÍCIA, Tourn. VETCH. TARE.

Calyx 5-cleft or 5-toothed, the 2 upper teeth often shorter. Style thread-shaped, hairy all round the apex or down the outer side (next the keel). Pod 2-valved, 2 - several-seeded. Stamens diadelphous, 9 & 1. Seeds globular. Cotyledons very thick, remaining under ground in germination. — Climbing shrubs. Leaves abruptly pinnate, the petiole terminating in a tendril. Stipules usually half arrow-shaped. (The old Latin name.)

* *Annual: flowers* 1 - 2 *in the axils, nearly sessile, large, violet-purple.*

1. **V. SATÌVA, L.** (COMMON VETCH OR TARE.) Somewhat pubescent; stem simple; leaflets 5 - 7 pairs, varying from obovate-oblong to linear, notched

and mucronate at the apex; pod linear, several-seeded. — Cultivated fields and waste places; both the common form and the var. ANGUSTIFÒLIA, with longer and narrow leaflets. (Adv. from Eu.)

* * *Annual: peduncles elongated: flowers small.* (Species of Ervum, *L.*)

2. **V.** TETRASPÉRMA, L. *Peduncles* 1 – *2-flowered;* leaflets 4 – 6 pairs, linear-oblong, obtuse; calyx-teeth unequal; *pods narrowly oblong, 4-seeded, smooth.* — Waste or open places, near the coast. — An insignificant plant, 6′ – 12′ high, with whitish flowers. (Nat. from Eu.)

3. **V.** HIRSÙTA, Koch. *Peduncles* 3 – *6-flowered;* leaflets 6 – 8 pairs, truncate; calyx-teeth equal; *pods oblong, 2-seeded, hairy.* (Ervum hirsutum, *L.*) — Massachusetts to Virginia. — A slender straggling plant, with small purplish-blue flowers. (Nat. from Eu.)

* * * *Perennial: peduncles elongated; calyx-teeth very unequal: pod several-seeded.*

4. **V. Crácca,** L. Downy-pubescent; *leaflets* 20 – 24, *oblong-lanceolate, strongly mucronate; peduncles densely many-flowered;* calyx-teeth shorter than the tube. Borders of thickets, New England to Kentucky and northward. July. — Flowers blue, turning purple, ½′ long, one-sided in the spike, reflexed. (Eu.)

5. **V. Caroliniàna,** Walt. Nearly smooth; *leaflets* 8 – 12, *oblong, obtuse, scarcely mucronate; peduncles loosely flowered;* calyx-teeth very short. — River-banks, &c. May. — Flowers more scattered than in No. 4, whitish, the keel tipped with blue.

6. **V. Americàna,** Muhl. Glabrous; *leaflets* 10 – 14, *elliptical or ovate-oblong,* very obtuse, many-veined; *peduncles* 4 – *8-flowered.* — Moist thickets, New York to Kentucky and northward. June. — Flowers purplish-blue, ¾′ long.

21. LÁTHYRUS, L. VETCHLING. EVERLASTING PEA.

Style flattish, not grooved above, hairy along the inner side (next the free stamen). Otherwise nearly as in Vicia. (Λάθυρος, a leguminous plant of Theophrastus.) — Our wild species are perennial and mostly smooth plants.

1. **L. marítimus,** Bigelow. (BEACH PEA.) Stem stout (1° high); leaflets 4 – 8 pairs, crowded, oval or obovate; *stipules broadly halberd-shaped, nearly as large as the leaflets;* peduncles 6 – 10-flowered. — Sea-coast, from New Jersey northward, and shore of the Great Lakes. June – Aug. — Flowers large, purple. Leaflets very veiny, as also are those of the other species. (Eu.)

2. **L. venòsus,** Muhl. Stem climbing (2° – 5° high); leaflets 5 – 7 pairs, scattered, oblong-ovate, often downy beneath; *stipules very small and usually slender, half arrow-shaped; peduncles many-flowered; corolla purple.* — Shady banks, Michigan, Wisconsin, and southward. June.

3. **L. ochroleùcus,** Hook. Stem slender (1° – 3° high); leaflets 3 – 4 pairs, ovate or oval, smooth, glaucous, thin; *stipules half heart-shaped, about half as large as the leaflets;* peduncles 7 – 10-flowered; *corolla yellowish-white.* — Hill-sides, W. Vermont to Penn., and westward and northward. July.

4. **L. palústris,** L. (MARSH VETCHLING.) Stem slender (1° – 2° high), often wing-margined; leaflets 2 – 4 pairs, lanceolate, linear, or narrowly

oblong, mucronate-pointed; *stipules small, lanceolate,* half arrow-shaped, sharp-pointed at both ends; peduncles 3 - 5-flowered; *corolla blue-purple.* — Moist places, N. England to Penn., Wisconsin, and northward. July. (Eu.)

Var **myrtifòlius.** Taller, climbing 2° - 4° high; leaves oblong or ovate-elliptical; upper stipules larger: corolla pale purple. (L. myrtifolius, *Muhl.*) — W. New England to Penn., and northward.

L. LATIFÒLIUS (EVERLASTING PEA) and L. ODORÀTUS (SWEET PEA) are commonly cultivated species.

PISUM SATÌVUM, the PEA; FÀBA VULGÀRIS, the HORSE-BEAN; and CÌCER ARIETÌNUM, the CHICK-PEA, are other cultivated representatives of the same tribe.

22. PHASÈOLUS, L. KIDNEY BEAN.

Calyx 5-toothed or 5-cleft, the 2 upper teeth often higher united. Keel of the corolla, with the included stamens and style, spirally coiled or twisted, or curved into a ring. Stamens diadelphous. Pod linear or scythe-shaped, several many-seeded, tipped with the hardened base of the style. Cotyledons thick and fleshy, rising out of the ground nearly unchanged in germination. — Twining or prostrate herbs, with pinnately 3-foliolate stipellate leaves. Flowers often clustered on the knotty joints of the raceme. (The ancient name of the Kidney Bean.)

* *Pods scymetar-shaped: racemes long and loose, panicled.*

1. **P. perénnis,** Walt. (WILD BEAN.) Stem climbing high; leaflets roundish-ovate, short-pointed; pods drooping, strongly curved, 4 - 5-seeded. ♃ — Copses, Connecticut to Kentucky, and southward. Aug. — Flowers purple, handsome, but small.

* * *Pods long and straight, linear, rather terete: flowers few in a short clustered raceme like a head.* (Strophóstyles, *Ell.*)

2. **P. diversifòlius,** Pers. *Annual;* stem prostrate, spreading, rough-hairy; *leaflets ovate-3-lobed, or angled* towards the base, or some of them oblong-ovate and entire; peduncles at length twice the length of the leaves. — Sandy fields and banks, Massachusetts to Illinois and southward. July, Aug. — Corolla greenish-white tinged with red or purple. Pod thickish.

3. **P. hélvolus,** L. *Perennial,* hairy; stems diffuse, slender; *leaflets ovate or oblong, entire or obscurely angled; peduncles* 3 - 6 *times the length of the leaves.* — Sandy fields, S. New York to Illinois and southward. Aug. — More slender than the last: pods narrower: flowers as large and similar.

* * *Pods straight and linear, flat: peduncles* 1 *-few-flowered at the summit: flowers small: keel slightly twisted.*

4. **P. pauciflòrus,** Benth. Annual; stems diffuse, but twining, slender, pubescent; leaflets varying from oblong-lanceolate or ovate-oblong to linear. (P. leiospermus, *Torr. & Gr.*) — River-banks, Illinois (*Mead*) and southwestward. July - Sept. — Flowers 3″ long, purple. Pod 1′ long, pubescent.

P. VULGÀRIS is the common KIDNEY BEAN or HARICOT.

P. LUNÀTUS is the LIMA BEAN of our gardens.

23. ÁPIOS, Boerh. GROUND-NUT. WILD BEAN.

Calyx somewhat 2-lipped, the 2 lateral teeth being nearly obsolete, the lower one longest. Standard very broad, reflexed: the incurved scythe-shaped keel at length twisted. Stamens diadelphous. Pod straight or slightly curved, linear, elongated, thickish, many-seeded. — A perennial herb, bearing edible tubers on underground shoots, twining and climbing over bushes. Leaflets 5 – 7, ovate-lanceolate, not stipellate. Flowers in dense and short, often branching racemes, clustered. (Name from ἄπιον, *a pear*, from the shape of the tubers.)

1. **A. tuberòsa,** Mœnch. (Glýcine Apios, *L.*) — Moist thickets, common. Aug. — Flowers brown-purple, fragrant.

24. RHYNCHÒSIA, Lour., DC. RHYNCHOSIA.

Calyx somewhat 2-lipped, or deeply 4 – 5-parted. Keel scythe-shaped, not twisted. Stamens diadelphous. Ovules 2. Pod 1 – 2-seeded, short and flat, 2-valved. — Usually twining or trailing perennial herbs, pinnately 3-foliolate, or with a single leaflet, not stipellate. Flowers yellow, racemose or clustered. (Name from ῥύγχος, *a beak*, from the shape of the keel.)

1. **R. tomentòsa,** Torr. & Gray. More or less downy; leaflets roundish; racemes short or capitate; calyx about as long as the corolla, 4-parted, the upper lobe 2-cleft; pod oblong. — Very variable.

Var. **monophýlla,** Torr. & Gray. Dwarf and upright (3′ – 6′ high); leaves mostly of a single round leaflet (1′ – 2′ wide). — S. Virginia and southward, in dry sandy soil.

Var. **volùbilis,** Torr. & Gray. Trailing and twining, less downy; leaflets 3, roundish; racemes few-flowered, almost sessile in the axils. — S. Virginia and southward.

Var. **erécta,** Torr. & Gray. Upright (1° – 2° high), soft-downy; leaflets 3, oval or oblong. — Maryland and southward.

25. GALÁCTIA, P. Browne. MILK PEA.

Calyx 4-cleft; the lobes acute, the upper one broadest. Keel scarcely incurved. Stamens diadelphous. Pod linear, flat, several-seeded (some few of them are occasionally partly subterranean and fleshy or deformed). — Low, mostly prostrate or twining perennial herbs. Leaflets usually 3, stipellate. Flowers in somewhat interrupted or knotty racemes, purplish. (Name from γάλα, -ακτος, *milk;* some species being said to yield a milky juice, which is unlikely.)

1. **G. glabélla,** Michx. *Stems nearly smooth,* prostrate; leaflets elliptical or ovate-oblong, sometimes slightly hairy beneath; racemes short, 4 – 8-flowered; *pods somewhat hairy.* — Sandy woods, S. New York and New Jersey to Virginia near the coast, and southward. July – Sept. — Flowers large for the genus, rose-purple.

2. **G. móllis,** Michx. *Stems* (decumbent and somewhat twining) and

leaves beneath soft-downy and hoary; leaflets oval; racemes many-flowered; *pods very downy.* — S. Pennsylvania, Maryland, and southward. July.

26. AMPHICARPÆ̀A, Ell. Hog Pea-nut.

Flowers of 2 kinds, those of the racemes from the upper branches perfect, but seldom ripening fruit; those near the base and on creeping branches imperfect, with the corolla none or rudimentary, and few free stamens, but fruitful. Calyx about equally 4- (rarely 5-) toothed, with no bractlets. Keel and wing-petals similar, nearly straight; the standard partly folded round them. Stamens diadelphous. Pods of the upper flowers, when formed, somewhat scymetar-shaped, 3 – 4-seeded; of the lower, obovate or pear-shaped, fleshy, ripening usually but one large seed, commonly subterranean, or concealed by decaying leaves. — Low and slender perennials; the twining stems clothed with brownish hairs. Leaves pinnately 3-foliolate: leaflets rhombic-ovate, stipellate. Flowers small, in clustered or compound racemes, purplish. Bracts persistent, round, partly clasping, striate, as well as the stipules. (Name from ἀμφί, *at both ends,* and καρπός, *fruit,* in allusion to the two kinds of fruit, one at the summit, the other at the base of the plant.)

1. **A. monoìca,** Nutt. Racemes nodding; bracts each supporting 2 or more flowers, shorter than the pedicels; subterranean pods hairy. — Rich woodlands. Aug., Sept. — A delicate vine.

27. CLITÒRIA, L. Butterfly Pea.

Calyx tubular, 5-toothed. Standard much larger than the rest of the flower, rounded, notched at the top, not spurred on the back: keel small, shorter than the wings. Stamens monadelphous below. Pod linear-oblong, flattish, knotty, several-seeded, pointed with the base of the style, the valves nerveless. — Erect or twining perennials, with mostly pinnately 3-foliolate stipellate leaves, and very large flowers. Peduncles 1 – 3-flowered: bractlets opposite, striate. (Derivation obscure.)

1. **C. Mariàna,** L. Smooth; leaflets oblong-ovate or ovate-lanceolate; stipules and bracts awl-shaped; peduncles short; 1 – 3-flowered. — Dry banks, Long Island to Virginia and southward. July. — Low, ascending or twining; the showy pale-blue flowers 2′ long.

28. CENTROSÈMA, DC. Spurred Butterfly Pea.

Calyx short, 5-cleft. Corolla, &c. much as in Clitoria, but the standard with a spur-shaped projection on the back. Pod long and linear, flat, pointed with the awl-shaped style, many-seeded, thickened at the edges, the valves marked with a raised line on each side next the margin. — Twining perennials, with 3-foliolate stipellate leaves and large showy flowers. Stipules, bracts, and bractlets striate, the latter longer than the calyx. (Name from κέντρον, *a spur,* and σῆμα, *the standard.*)

1. **C. Virginiàna,** Benth. Rather rough with minute hairs; leaflets

varying from oblong-ovate to lanceolate and linear, very veiny, shining; peduncles 1–4-flowered; calyx-teeth linear-awl-shaped.—Sandy dry woods, Virginia and southward. July.—Corolla 1' long, violet. Pods straight, narrow, 4'–5' long.

29. BAPTÍSIA, Vent. FALSE INDIGO.

Calyx 4–5-toothed. Standard not longer than the wings, its sides reflexed: keel-petals nearly separate, and, like the wings, straight. Stamens 10, distinct. Pod stalked in the persistent calyx, roundish or oblong, inflated, pointed, many-seeded.—Perennial herbs, with palmately 3-foliolate (rarely simple) leaves, which generally blacken in drying, and racemed flowers. (Named from βαπτίζω, *to dye*, from the economical use of some species, which yield a sort of indigo.)

1. **B. tinctòria,** R. Brown. (WILD INDIGO.) Smooth and slender (2°–3° high), rather glaucous; leaves almost sessile; leaflets rounded wedge-obovate (¾' long); *stipules and bracts minute and deciduous; racemes few-flowered,* terminating the bushy branches; pods oval-globose, on a stalk longer than the calyx.—Sandy dry soil, common. June–Aug.—Corolla yellow, ½' long.

2. **B. austràlis,** R. Brown. (BLUE FALSE-INDIGO.) Smooth, tall and stout (4°–5°); leaflets oblong-wedge-form, obtuse; *stipules lanceolate, as long as the petioles, rather persistent; raceme elongated* (1°–2°) *and many-flowered, erect;* bracts deciduous; *stalk of the oval-oblong pods about the length of the calyx.* —Alluvial soil, from Penn. westward and southward: often cultivated. June. —Flowers 1' long, indigo-blue. Pods 2'–3' long.

3. **B. leucántha,** Torr. & Gr. Smooth; stems, leaves, and racemes as in No. 2; *stipules early deciduous; pods oval-oblong, raised on a stalk fully twice the length of the calyx.*—Alluvial soil, Ohio to Wisconsin and southwestward. July —Flowers white; the standard short. Pods 2' long.

4. **B. álba,** R. Brown. Smooth (1°–3° high); the *branches slender and widely spreading; petioles slender; stipules and bracts minute* and deciduous; leaflets oblong or oblanceolate; racemes slender on a long naked peduncle; *pods linear-oblong* (1'–1½' long), *short-stalked.*—Dry soil, Virginia and southward. May, June.—Flowers white, ½'–¾' long.

5. **B. leucophæ̀a,** Nutt. *Hairy, low* (1° high), with *divergent branches, leaves almost sessile;* leaflets narrowly oblong-obovate or spatulate; *stipules and bracts large and leafy, persistent; racemes long, reclined; flowers on elongated pedicels;* pods ovoid, hoary.—Michigan to Wisconsin and southward. April, May.— Raceme often 1° long: pedicels 1'–2', the cream-colored corolla 1', in length

30. CLADRÁSTIS, Raf. YELLOW-WOOD.

Calyx 5-toothed. Standard large, roundish, reflexed: the distinct keel-petals and wings straight, oblong. Stamens 10, distinct: filaments slender, incurved above. Pod short-stalked above the calyx, linear, flat, thin, marginless, 4–6-seeded, at length 2-valved.—A small tree, with yellow wood, nearly smooth, with pinnate leaves of 7–11 oval or ovate leaflets, and ample panicled racemes of showy white flowers drooping from the end of the branches. Stipules obsolete. Base of the petioles hollow, and enclosing the leaf-buds of the next year. Bracts minute and fugacious. (Name of obscure derivation.)

1. **C. tinctòria,** Raf. (Virgílìa lutea, *Michx. f.*) Rich hill-sides, E. Kentucky and Tennessee. May. — Racemes 10′–20′ long. Flowers 1′ long

SUBORDER II. CÆSALPINÌEÆ. THE BRASILETTO FAMILY.

31. CÉRCIS, L. RED-BUD. JUDAS-TREE.

Calyx 5-toothed. Corolla imperfectly papilionaceous: standard smaller than the wings, and enclosed by them in the bud: the keel-petals larger and not united. Stamens 10, distinct, rather unequal. Pod oblong, flat, many-seeded, the upper suture with a winged margin. Embryo straight. — Trees, with rounded-heart-shaped simple leaves, deciduous stipules, and red-purple flowers in little umbel-like clusters along the branches, appearing before the leaves, acid to the taste. (The ancient name of the Oriental *Judas-tree.*)

1. **C. Canadénsis,** L. (RED-BUD.) Leaves pointed; pods nearly sessile above the calyx. — Rich soil, New York to Ohio, Kentucky, and southward. March - May. — A small ornamental tree, often cultivated: the blossoms smaller than in the European species.

32. CÁSSIA, L. SENNA.

Sepals 5, scarcely united. Petals 5, unequal, not papilionaceous, spreading. Stamens 5–10, unequal, and some of them often imperfect, spreading: anthers opening by 2 pores or chinks at the apex. Pod many-seeded, often with cross partitions. — Herbs (in the United States), with simply and abruptly pinnate leaves, and mostly yellow flowers. (An ancient name, of obscure derivation.)

* *Leaflets large: stipules deciduous: the 3 upper anthers deformed and imperfect: flowers crowded in short axillary racemes, the upper ones panicled.*

1. **C. Marilándica,** L. (WILD SENNA.) *Leaflets* 6–9 *pairs, lanceolate-oblong, obtuse;* petiole with a club-shaped gland near the base; *pods* linear, slightly curved, flat, at first *hairy* (2′–4′). ♃ — Alluvial soil, common. July. — Stem 3°–4° high. Leaves used as a substitute for the officinal *Senna.*

2. C. OCCIDENTÀLIS, L. *Leaflets* 4–6 *pairs, ovate-lanceolate, acute* or pointed; an ovate gland at the base of the petiole; *pods* clongated-linear (5′ long) with a tumid border, *glabrous.* ① ♃ ? — Virginia and southward. Aug. (Adv. from Trop. Amer.)

* * *Leaflets small, somewhat sensitive to the touch: stipules striate, persistent: a cup-shaped gland beneath the lowest pair of leaflets: anthers all perfect: flowers in small clusters above the axils: pods flat.*

3. **C. Chamæcrista,** L. (PARTRIDGE PEA.) Leaflets 10–15 pairs, linear-oblong, oblique at the base; *flowers* (*large*) *on slender pedicels; anthers* 10, *elongated, unequal* (4 of them yellow, the others purple); style slender. ① — Sandy fields; common, especially southward. Aug. — Stems spreading, 1° long: 2 or 3 of the showy yellow petals often with a purple spot at the base.

4. **C. nictitans,** L. (Wild Sensitive-Plant.) Leaflets 10–20 pairs, oblong-linear; *flowers* (*very small*) *on very short pedicels; anthers* 5, *nearly equal;* style very short. ①—Sandy fields, New England, near the coast, to Virginia and southward. Aug.

33. GYMNÓCLADUS, Lam. Kentucky Coffee-tree.

Flowers diœcious, regular. Calyx tubular below, 5-cleft. Petals 5, oblong, equal, inserted on the summit of the calyx-tube. Stamens 10, distinct, short, inserted with the petals. Pod oblong, flattened, hard, pulpy inside, several-seeded. Seeds flattish.—A tall large tree, with rough bark, stout branchlets, not thorny, and very large unequally twice-pinnate leaves. Flowers whitish, in axillary racemes. (Name from γυμνός, *naked*, and κλάδος, *a branch*, alluding to the stout branches destitute of spray.)

1. **G. Canadénsis,** Lam. Rich woods, by rivers, W. New York and Penn. to Illinois and southwestward. June.—Cultivated as an ornamental tree: timber valuable. Leaves 2°–3° long, with several large partial leafstalks bearing 7–13 ovate stalked leaflets, the lowest pair with single leaflets. Pod 6′–10′ long, 2′ broad; the seeds over ½′ across.

34. GLEDÍTSCHIA, L. Honey-Locust.

Flowers polygamous. Calyx of 3–5 spreading sepals, united at the base. Petals as many as the sepals, and equalling them, the 2 lower sometimes united. Stamens as many, distinct; inserted with the petals on the base of the calyx. Pod flat, 1–many-seeded. Seeds flat.—Thorny trees, with abruptly once or twice pinnate leaves, and inconspicuous greenish flowers in small spikes. Thorns above the axils. (Named in honor of *Gleditsch*, a botanist contemporary with Linnæus.)

1. **G. triacánthos,** L. (Three-thorned Acacia, or Honey-Locust.) Thorns stout, often triple or compound; *leaflets lanceolate-oblong*, somewhat serrate; *pods linear, elongated* (1°–1½° long), often twisted, filled with sweet pulp between the seeds.—Rich woods, Penn. to Illinois and southwestward. June.—Common in cultivation as an ornamental tree, and for hedges.

2. **G. monospérma,** Walt. (Water-Locust.) Thorns slender; mostly simple; *leaflets ovate or oblong; pods oval,* 1-*seeded,* pulpless.—Swamps, Illinois and southwestward. July.—A small tree.

Suborder III. MIMÒSEÆ. The Mimosa Family.

35. DESMÁNTHUS, Willd. Desmanthus.

Flowers perfect or polygamous. Calyx campanulate, 5-toothed. Petals 5, distinct. Stamens 5 or 10. Pod flat, membranaceous or somewhat coriaceous, several-seeded, 2-valved, smooth.—Herbs with twice-pinnate leaves of numerous small leaflets, and with one or more glands on the petiole, setaceous stipules, and axillary peduncles bearing a head of small greenish-white flowers. (Name composed of δέσμα, *a bond*, and ἄνθος, *flower*.)

1. **D. brachylobus,** Benth. Nearly glabrous, erect (1°–4° high); partial petioles 6–15 pairs; leaflets 20–30 pairs; stamens 5; pods oblong or lanceolate, curved, scarcely 1 long, 2–6-seeded. ♃ (Darlingtonia brachyloba & glandulosa, *DC.*) — Prairies and alluvial banks, Illinois and southwestward.

36. SCHRÁNKIA, Willd. SENSITIVE BRIAR.

Flowers polygamous. Calyx minute, 5-toothed. Petals united into a funnelform 5-cleft corolla. Stamens 10–12, distinct, or the filaments united at the base. Pods long and narrow, rough-prickly, several-seeded, 4-valved, i. e. the two narrow valves separating on each side from a thickened margin. — Perennial herbs, the procumbent stems and petioles prickly, with twice-pinnate sensitive leaves of many small leaflets, and axillary peduncles bearing round heads of small rose-colored flowers. (Named for *Schrank*, a German botanist.)

1. **S. uncinàta,** Willd. Prickles hooked; partial petioles 4–6 pairs; *leaflets elliptical, reticulated* with strong veins beneath; pods oblong-linear, nearly terete, short-pointed, densely prickly (2′ long). — Dry sandy soil, Virginia, Illinois? and southward. June–Aug.

2. **S. angustàta,** Torr. & Gray. *Leaflets oblong-linear, scarcely veined;* pods slender, taper-pointed, sparingly prickly (about 4′ long). — With the preceding.

ORDER 39. ROSÀCEÆ. (ROSE FAMILY.)

Plants with regular flowers, numerous (rarely few) distinct stamens inserted on the calyx, and 1–many pistils, which are quite distinct, or (in the Pear tribe) united and combined with the calyx-tube. Seeds (anatropous) 1–few in each ovary, without albumen. Embryo straight, with large and thick cotyledons. Leaves alternate, with stipules. — Calyx of 5 or rarely 3–4–8 sepals (the odd one superior), united at the base, often appearing double by a row of bractlets outside. Petals as many as the sepals (rarely wanting), mostly imbricated in the bud, and inserted with the stamens on the edge of a disk that lines the calyx-tube. Trees, shrubs, or herbs. This important family comprises three principal suborders, viz.: —

SUBORDER I. AMYGDALEÆ. THE ALMOND FAMILY.

Calyx entirely free from the solitary ovary, deciduous. Style terminal. Fruit a drupe (stone-fruit). — Trees or shrubs, with simple leaves, the bark exuding gum, and the bark, leaves, and kernels yielding the peculiar flavor of prussic acid. Stipules free.

1. PRUNUS. Stone of the drupe smooth, or merely furrowed on the edges.

SUBORDER II. ROSACEÆ PROPER.

Calyx free from the ovaries, but sometimes enclosing them in its tube. Pistils few or many (occasionally single). Stipules commonly united with the petiole.

TRIBE I. **SPIRÆEÆ.** Pistils mostly 5, forming follicles in fruit: styles terminal.

2. SPIRÆA. Calyx 5-cleft. Petals obovate, equal, imbricated in the bud.
3. GILLENIA. Calyx elongated, 5-toothed. Petals slender, unequal, convolute in the bud.

TRIBE II. **DRYADEÆ.** Pistils numerous (rarely 1-2), forming seed-like achenia or little drupes in fruit. Calyx-tube dry in fruit; the lobes commonly valvate in the bud.

Subtribe 1. SANGUISORBEÆ. Calyx-tube constricted at the throat. Petals often wanting. Stamens 4-15. Pistils 1-4, dry in fruit, enclosed in the calyx.

4. AGRIMONIA. Petals 5. Stamens 12-15. Pistils 2: style terminal.
5. SANGUISORBA. Petals none. Stamens 4. Pistil 1: style terminal.
6. ALCHEMILLA. Petals none. Stamens and pistils 1-4: style lateral.

Subtribe 2. CHAMÆRHODEÆ. Calyx open. Stamens & pistils 5-10: styles lateral. Fruit dry.

7. SIBBALDIA. Stamens 5, alternate with the minute petals.

Subtribe 3. EUDRYADEÆ. Calyx open. Stamens and pistils numerous. Fruit of dry achenia, tipped with terminal styles. Seed erect. (Radicle inferior.)

8. DRYAS. Calyx 8-9-parted. Petals 8-9. Styles persistent, plumose.
9. GEUM. Calyx 5-cleft. Petals 5. Achenia numerous: styles persistent.
10. WALDSTEINIA. Calyx 5-cleft. Achenia few: styles deciduous from the base.

Subtribe 4. FRAGARIEÆ. Calyx open and flattish, bracteolate. Stamens and pistils numerous: styles often lateral, deciduous. Fruit of dry achenia. Seed suspended or ascending, inserted next the base of the style. (Radicle always superior.)

11. POTENTILLA. Receptacle dry, flat, convex, or oblong.
12. FRAGARIA. Receptacle conical, enlarged and succulent in fruit, edible.

Subtribe 5. DALIBARDEÆ. Calyx open, not bracteolate. Stamens and usually the pistils numerous: styles terminal, deciduous. Achenia mostly fleshy, or becoming little drupes. Seed suspended (ovules 2, collateral: radicle superior).

13. DALIBARDA. Fruit of 5-10 almost dry achenia, in the bottom of the calyx.
14. RUBUS. Fruit of numerous (rarely few) pulpy drupaceous achenia, aggregated on a conical or elongated receptacle.

TRIBE III. **ROSEÆ.** Pistils numerous, forming achenia, inserted on the hollow receptacle which lines the urn-shaped and fleshy calyx-tube. Calyx-segments imbricated.

15. ROSA. Leaves pinnate: stipules cohering with the petiole.

SUBORDER III. POMEÆ. THE PEAR FAMILY.

Calyx-tube thick and fleshy in fruit (forming a *pome*), including and cohering with the 2-5 ovaries. Stipules free.

16. CRATÆGUS. Carpels bony in fruit, 1-seeded.
17. PYRUS. Carpels papery or cartilaginous in fruit, 2-seeded.
18. AMELANCHIER. Carpels cartilaginous, each divided into 2 cells by a partition: cells 1-seeded.

SUBORDER I. AMYGDÀLEÆ. THE ALMOND FAMILY.

1. PRÙNUS, L. PLUM & CHERRY.

Calyx 5-cleft. Petals 5, spreading. Stamens 15-30. Ovary with 2 pendulous ovules. Drupe fleshy; the stone smooth and even. — Small trees or shrubs. Flowers commonly white. (The ancient classical name of the Plum.)

§ 1. PRÙNUS, Tourn. (PLUM.) — *Drupe usually with a bloom; the stone flattened, or at least wider than thick: leaves convolute in the bud, flowers more or less preceding the leaves, from lateral buds; the pedicels few or several, in simple umbel-like clusters.*

1. **P. Americàna,** Marsh. (WILD YELLOW or RED PLUM.) *Leaves ovate* or somewhat obovate, *conspicuously pointed, coarsely or doubly serrate, very veiny, glabrous when mature;* fruit nearly destitute of bloom, roundish-oval, yellow, orange, or red, ½'-¾' in diameter, with the turgid stone more or less acute on both margins, or in cultivated states 1' or more in diameter, having a flattened stone with broader margins (pleasant-tasted, but with a tough and acerb skin). — River-banks, common. May. — Tree or bush thorny, 8°-20° high.

2. **P. marítima,** Wang. (BEACH PLUM.) Low and straggling (2°-5°); *leaves ovate or oval, finely serrate, softly pubescent underneath;* pedicels short, pubescent; fruit globular, purple or crimson with a bloom (½'-1' in diameter), the stone very turgid, acute on one edge, rounded and minutely grooved on the other. (P. littoràlis, *Bigelow.*) — Varies, when at some distance from the coast, with the leaves smoother and thinner, and the fruit smaller. (P. pygmæ̀a, *Willd.*) — Sea-beach and the vicinity, Massachusetts to New Jersey and Virginia. April, May.

3. **P. Chicàsa,** Michx. (CHICKASAW PLUM.) Stem scarcely thorny (8°-15° high); *leaves nearly lanceolate, finely serrulate, glabrous,* little veiny; fruit globular, red, nearly destitute of bloom (½'-¾' in diameter); the ovoid stone almost as thick as wide, rounded at both sutures, one of them minutely grooved. — Kentucky (where probably it is not indigenous) and southwestward: naturalized in some places. April.

4. **P.** SPINÒSA, L. (SLOE. BLACK THORN.) Branches thorny; *leaves obovate-oblong or ovate-lanceolate, sharply serrate, at length glabrous;* pedicels glabrous; fruit small, globular, black with a bloom, the stone turgid, acute on one edge. — Var. INSITÍTIA (BULLACE-PLUM), is less spiny, the pedicels and lower side of the leaves pubescent. (P. insititia, *L.*) — Road-sides and waste places, E. New England, Penn., &c. (Adv. from Eu.)

§ 2. CÉRASUS, Tourn. (CHERRY.) — *Drupe destitute of bloom; the stone globular and marginless; leaves folded* (*conduplicate*) *in the bud: inflorescence as in* § 1.

5. **P. pùmila,** L. (DWARF CHERRY.) Smooth, depressed and trailing (6'-18' high); *leaves obovate-lanceolate, tapering to the base,* somewhat toothed near the apex, *pale underneath;* flowers 2-4 together; fruit ovoid, dark red. — Rocks or sandy banks, Massachusetts northward to Wisconsin, and south to Virginia along the mountains. May.

6. **P. Pennsylvánica,** L. (WILD RED CHERRY.) *Leaves oblong-lanceolate, pointed, finely and sharply serrate, shining, green and smooth both sides;* flowers many in a cluster, on long pedicels; fruit globose, light red. — Rocky woods; common, especially northward. May. — Tree 20°-30° high, with light red-brown bark, and very small fruit with thin and sour flesh

§ 3. PÀDUS, Mill. (CHERRY.) — *Drupe, &c. as in § 2: flowers in racemes terminating the branches, developed after the leaves.*

7. **P. Virginiàna,** L. (CHOKE-CHERRY.) *Leaves oval, oblong, or obovate, abruptly pointed, very sharply (often doubly) serrate with slender teeth,* thin; racemes short and close; petals roundish; fruit red turning to dark crimson. — River-banks; common, especially northward. May. — A tall shrub, seldom a tree, with grayish bark; the fruit very austere and astringent till perfectly ripe. (P. obovàta, *Bigelow.* P. serotina, of many authors.)

8. **P. serótina,** Ehrhart. (WILD BLACK CHERRY.) *Leaves oblong or lanceolate-oblong, taper-pointed, serrate with incurved short and callous teeth,* thickish, shining above; racemes elongated; petals obovate; fruit purplish-black. — Woods, common. — A fine large tree, with reddish-brown branches, furnishing valuable timber to the cabinet-maker. Fruit slightly bitter, but with a pleasant vinous flavor.

P. DOMÉSTICA, L., the CULTIVATED PLUM, is now deemed by the best botanists to have sprung from the Sloe.

P. ARMENÌACA, L., the APRICOT, represents another subgenus of Prunus. The PEACH belongs to a very closely related genus.

P. ÀVIUM and P. CERASUS, L., of Europe, are the originals of the cultivated Cherries.

SUBORDER II. ROSÀCEÆ PROPER. THE TRUE ROSE FAMILY.

2. SPIRÆ̀A, L. MEADOW-SWEET.

Calyx 5-cleft, persistent. Petals 5, obovate, equal, imbricated in the bud. Stamens 10 – 50. Pods (follicles) 3 – 12, several- (2 – 15-) seeded. — Flowers white or rose-color, sometimes diœcious: rarely the parts are 4 instead of 5. (Name probably from σπειράω, *to wind,* alluding to the fitness of the plants to be formed into garlands.)

§ 1. PHYSOCÁRPOS, Camb. — *Shrubs, with simple palmately-lobed leaves and umbel-like corymbs: pods inflated and diverging when grown,* 2 – 4-*seeded.*

1. **S. opulifòlia,** L. (NINE-BARK.) Leaves roundish, somewhat 3-lobed and heart-shaped; pods 3 – 5. — Rocky river-banks. June. — Shrub 4° – 10° high, with recurved branches and white flowers, succeeded by membranaceous purplish pods: the old bark loose and separating in thin layers.

§ 2. SPIRÆA PROPER. — *Shrubs, with simple leaves, the stipules obsolete: pods (mostly* 5) *not inflated, several-seeded.*

2. **S. corymbòsa,** Raf. Nearly smooth (1° – 2° high); leaves oval or ovate, cut-toothed towards the apex; *corymbs large, flat,* several times compound. — Alleghanies of Penn., to Virginia and Kentucky. June. — Flowers white.

3. **S. salicifòlia,** L. (COMMON MEADOW-SWEET.) *Nearly smooth* (2° – 3° high); leaves wedge-lanceolate, simply or doubly serrate; *flowers in a crowded panicle;* pods smooth. — Wet grounds: also cultivated. July. — Flowers white or flesh-color. (Eu.)

4. **S. tomentòsa,** L. (HARDHACK. STEEPLE-BUSH.) *Stems and lower surface of the* ovate or oblong serrate *leaves very woolly;* flowers in short racemes crowded in a dense panicle; pods woolly.—Low grounds; commonest in New England. July.—Flowers rose-color.

§ 3. ULMÀRIA, Mœnch.—*Perennial herbs, with pinnate leaves and panicled cymose flowers: calyx reflexed: pods* 5–8 *in number,* 1–2-*seeded.*

5. **S. lobàta,** Murr. (QUEEN OF THE PRAIRIE.) Glabrous (2°–8° high); leaves interruptedly pinnate; the terminal leaflet very large, 7–9-parted, the lobes incised and toothed; stipules kidney-form; panicle compound-clustered, on a long naked peduncle.—Meadows and prairies, Penn. to Michigan, Illinois, and Kentucky. June.—Flowers deep peach-blossom color, handsome, the petals and sepals often in fours!

§ 4. ARÚNCUS, Seringe.—*Perennial herbs, with diœcious whitish flowers, in slender spikes disposed in a long compound panicle; leaves thrice-pinnate; the stipules obsolete: pods* 3–5, *several-seeded: pedicels reflexed in fruit.*

6. **S. Arúncus,** L. (GOAT'S-BEARD.) Smooth, tall; leaflets thin, lanceolate-oblong, or the terminal ones ovate-lanceolate, taper-pointed, sharply cut and serrate.—Rich woods, Catskill and Alleghany Mountains and westward. June. (Eu.)

S. FILIPÉNDULA, the DROPWORT; S. ULMÀRIA, the MEADOW-SWEET of Europe; S. HYPERICIFÒLIA (ITALIAN MAY); and S. SORBIFÒLIA, are common in gardens.

3. GILLÈNIA, Mœnch. INDIAN PHYSIC.

Calyx narrow, constricted at the throat, 5-toothed; teeth erect. Petals 5, somewhat unequal, linear-lanceolate, inserted in the throat of the calyx; convolute in the bud. Stamens 10–20, included. Pods 5, included, 2–4-seeded.—Perennial herbs, with almost sessile 3-foliolate leaves, the thin leaflets doubly serrate and incised. Flowers loosely paniculate-corymbed, pale rose-color or white. (Dedicated to an obscure botanist or gardener, *A. Gille,* or *Gillenius.*)

1. **G. trifoliàta,** Mœnch. (BOWMAN'S ROOT.) Leaflets ovate-oblong, pointed, cut-serrate; stipules small, awl-shaped, entire.—Rich woods, from W. New York southward, and sparingly in the Western States. July.

2. **G. stipulàcea,** Nutt. (AMERICAN IPECAC.) Leaflets lanceolate, deeply incised; stipules large and leaf-like, doubly incised.—From W. Pennsylvania and New York to Illinois and Kentucky. June.

4. AGRIMÒNIA, Tourn. AGRIMONY.

Calyx-tube top-shaped, contracted at the throat, armed with hooked bristles above, indurated and enclosing the fruit; the limb 5-cleft, closed after flowering. Petals 5. Stamens 12–15. Achenia 2: styles terminal. Seed suspended.—Perennial herbs, with interruptedly pinnate leaves and yellow flowers in slender spiked racemes: bracts 3-cleft. (A corruption of *Argemonia,* of the same derivation as Argemone.)

1. **A. Eupatòria,** L. (COMMON AGRIMONY.) *Leaflets* 5 – 7 *with minute ones intermixed, oblong-obovate,* coarsely toothed; petals twice the length of the calyx. — Borders of woods, common. July - Sept. (Eu.)

2. **A. parviflòra,** Ait. *Leaflets crowded,* 11 – 19, *with smaller ones intermixed, lanceolate,* acute, deeply and regularly cut-serrate, as well as the stipules; petals small. — Woods and glades, Pennsylvania and southwestward. July.

5. SANGUISÓRBA, L. GREAT BURNET.

Calyx colored, 3-bracted, the tube 4-angled, constricted; the lobes 4, spreading. Petals none. Stamens 4; the filaments usually enlarging upwards. Pistils 1 or rarely 2: style slender, terminal: stigma pencil-form, tufted. Achenium included in the indurated 4-winged calyx-tube. Seed suspended. — Herbs, with unequally pinnate leaves, and small flowers, sometimes polygamous, in close spikes or heads. (Name from *sanguis*, blood, and *sorbeo*, to absorb; the plants having been esteemed as vulneraries.)

1. **S. Canadénsis,** L. (CANADIAN BURNET.) Stamens much longer than the calyx; spikes cylindrical and elongated in fruit; leaflets numerous, ovate or oblong-lanceolate, serrate, obtuse, heart-shaped at the base, stipellate; stipules serrate. ♃ — Bogs and wet meadows; chiefly northward. Aug. - Oct. — A tall herb: flowers white, sometimes purple.

POTÈRIUM SANGUISÓRBA, the COMMON BURNET of the gardens, has monœcious polyandrous flowers.

6. ALCHEMÍLLA, Tourn. LADY'S MANTLE.

Calyx-tube inversely conical, contracted at the top; limb 4-parted, with as many alternate bractlets. Petals none. Stamens 1 – 4. Pistils 1 – 4; the slender style arising from near the base of the ovary; the achenia included in the persistent calyx. — Low herbs, with palmately lobed or compound leaves, and small corymbed greenish flowers. (From *Alkemelyeh*, the Arabic name.)

1. A. ARVÉNSIS, L. (PARSLEY PIERT.) Stems (3′ – 8′ high) leafy; leaves 3-parted, with the wedge-shaped lobes 2 – 3-cleft, pubescent; flowers sessile in the axils. ① — Eastern Virginia. (Adv. from Eu.)

A. ALPÌNA, L., is said by Pursh to grow on the Green and White Mountains, New England: but there is most probably some mistake about it.

7. SIBBÁLDIA, L. SIBBALDIA.

Calyx flattish, 5-cleft, with 5 bractlets. Petals 5, linear-oblong, minute. Stamens 5, inserted alternate with the petals into the margin of the woolly disk which lines the base of the calyx. Achenia 5 – 10; styles lateral. — Low and depressed mountain perennials. (Dedicated to *Dr. Sibbald*, Prof. at Edinburgh at the close of the 17th century.)

1. **S. procúmbens,** L. Leaflets 3, wedge-shaped, 3-toothed at the apex; petals yellow. Alpine summits of the White Mountains of New Hampshire, and northward. (Eu.)

8. DRYAS, L. DRYAS.

Calyx flattish, 8–9-parted. Petals 8–9, large. Otherwise like Geum § Sieversia. — Dwarf and matted slightly shrubby plants, with simple toothed leaves, and solitary large flowers. (Name from *Dryades*, the nymphs of the Oaks, the foliage of some species resembling oak-leaves in miniature.)

1. **D. integrifòlia,** Vahl. Leaves oblong-ovate, slightly heart-shaped, with revolute margins, nearly entire, white-downy beneath, flowers white. — White Mountains, New Hampshire, *Prof. Peck*, according to *Pursh*; but not since met with: therefore very doubtful. (Eu.)

9. GÈUM, L. AVENS.

Calyx bell-shaped or flattish, deeply 5-cleft, usually with 5 small bractlets at the sinuses. Petals 5. Stamens many. Achenia numerous, heaped on a conical or cylindrical dry receptacle, the long persistent styles forming hairy or naked and straight or jointed tails. Seed erect. — Perennial herbs, with pinnate or lyrate leaves. (Name from γεύω, *to give an agreeable flavor*, the roots being rather aromatic.)

§ 1. GEUM PROPER. — *Styles jointed and bent near the middle, the lower portion smooth and persistent, naked, hooked at the end after the deflexed and mostly hairy upper joint falls away: head of fruit sessile: calyx-lobes reflexed.* (*Flowers somewhat panicled at the summit of the leafy stem.*)

1. **G. álbum,** Gmelin. Smoothish or softly pubescent; stem slender (2° high); root-leaves of 3–5 leaflets, or simple and rounded, with a few minute leaflets on the petiole below; those of the stem 3-divided, lobed, or only toothed; stipules small; *petals white* (3″ long), obovate or oblong, *fully as long as the calyx; receptacle and ovaries bristly-hairy;* upper joint of the style a little hairy. Borders of woods, common. May–Aug. — Near the European G. urbanum.

2. **G. Virginiànum,** L. Bristly-hairy, especially the stout stem; lower and root-leaves pinnate, very various, the upper mostly 3-parted or divided, incised; stipules small; *petals greenish-white, shorter than the calyx; receptacle and ovaries glabrous.* — Woods and low grounds; common northward. — Clearly different from the last.

3. **G. macrophýllum,** Willd. Bristly-hairy, stout (1°–3° high); root-leaves lyrately and interruptedly pinnate, with the *terminal leaflet very large and round-heart-shaped;* lateral leaflets of the stem-leaves 2–4, minute, the terminal roundish, 3-cleft, the *lobes wedge-form and rounded; petals yellow, obovate, longer than the calyx; receptacle of fruit nearly naked;* achenia bristly above. — Around the base of the White Mountains, New Hampshire: also Lake Superior and northward. June. (Eu.)

4. **G. stríctum,** Ait. Somewhat hairy (3°–5° high); root-leaves interruptedly pinnate, the leaflets wedge-obovate; *leaflets of the stem-leaves* 3–5, *rhombic-ovate or oblong, acute; petals yellow, roundish, longer than the calyx; receptacle downy;* achenia bristly above. — Moist meadows; common, especially northward. July. (Eu.)

§ 2. STYLIPUS, Raf. — *Styles smooth: head of fruit conspicuously stalked in the calyx: bractlets of the calyx none: otherwise as* § 1.

5. **G. vérnum,** Torr. & Gr. Somewhat pubescent; stems ascending, few-leaved, slender; root-leaves roundish-heart-shaped, 3-5-lobed, or some of them pinnate, with the lobes cut; petals yellow, about the length of the calyx; receptacle smooth. — Thickets, Ohio to Illinois and Kentucky. April-June.

§ 3. CARYOPHYLLÀTA, Tourn. — *Style jointed and bent in the middle, the upper joint plumose: flowers large: calyx erect or spreading: petals erect.*

6. **G. rivàle,** L. (WATER or PURPLE AVENS.) Stems nearly simple, several-flowered (2° high); root-leaves lyrate and interruptedly pinnate; those of the stem few, 3-foliolate or 3-lobed; petals inversely heart-shaped, contracted into a claw, purplish-orange; head of fruit stalked. — Bogs and wet meadows, N. England to Wisconsin and northward. May. — Blossoms nodding, but the feathery fruiting heads upright. Calyx brown-purple. (Eu.)

§ 4. SIEVÉRSIA, Willd. — *Style not jointed, wholly persistent and straight: head of fruit sessile: flowers large: calyx erect or spreading.* (*Flowering stems simple, and bearing only bracts or small leaves.*)

7. **G. triflòrum,** Pursh. Low, softly hairy; root-leaves interruptedly pinnate; the leaflets very numerous and crowded, oblong-wedge-form, deeply cut-toothed; flowers 3 or more on long peduncles; *bractlets linear, longer than the purple calyx, as long as the oblong purplish erect petals; styles very long* (2′), *strongly plumose in fruit.* — Rocks, New Hampshire and N. New York northward to Wisconsin; rare. April-June.

8. **G. radiàtum,** Michx. Hirsutely hairy or smoothish; *root-leaves rounded-kidney-shaped*, radiate-veined (2′-5′ broad), doubly or irregularly cut-toothed and obscurely 5-7-lobed, also a set of minute leaflets down the long petiole; stems (8′-18′ high) 1-5-flowered; *bractlets minute; petals yellow, round-obovate* and more or less obcordate, exceeding the calyx (½′ long), *spreading; styles naked* except the base. (High mountains of Carolina.)

Var. **Péckii.** Nearly glabrous, or the stalks and veins of the leaves sparsely hirsute. (G. Peckii, *Pursh.*) — Alpine tops of the White Mountains of New Hampshire. July-Sept.

10. WALDSTEÍNIA, Willd. (COMARÓPSIS, *DC.*)

Calyx-tube inversely conical; the limb 5-cleft, with 5 often minute and deciduous bractlets. Petals 5. Stamens many, inserted into the throat of the calyx. Achenia 2-6, minutely hairy; the terminal slender styles deciduous from the base by a joint. Seed erect. — Low perennial herbs, with chiefly radical 3-5-lobed or divided leaves, and small yellow flowers on bracted scapes. (Named in honor of *Francis von Waldstein*, a German botanist.)

1. **W. fragarioìdes,** Tratt. (BARREN STRAWBERRY.) Low; leaflets 3, broadly wedge-form, cut-toothed; scapes several-flowered; petals longer than the calyx. (Dalibarda fragarioides, *Michx.*) — Wooded hill-sides, common northward, and southward along the Alleghanies.

11. POTENTÍLLA, L. Cinque-foil. Five-Finger.

Calyx flat, deeply 5-cleft, with as many bractlets at the sinuses, thus appearing 10-cleft. Petals 4-5, usually roundish. Stamens many. Achenia many, collected in a head on the dry mostly pubescent or hairy receptacle: styles lateral or terminal, deciduous. — Herbs, or rarely shrubs, with compound leaves, and solitary or cymose flowers. (Name a kind of diminutive from *potens*, powerful, alluding to the reputed medicinal power, of which in fact these plants possess very little, being merely mild astringents, like the rest of the tribe.)

§ 1. *Style terminal, or attached above the middle of the ovary: achenia glabrous.*

* *Annuals or biennials: petals pale yellow, small, not exceeding the calyx: receptacle globular, ovoid, or even oblong in fruit.*

1. **P. Norvègica,** L. Hairy, *erect*, branched above; *leaves palmately 3-foliolate;* leaflets obovate-oblong, cut-toothed. — Fields: common, especially northward. A homely weed. (Eu.)

2. **P. paradóxa,** Nutt. Somewhat pubescent, *spreading or decumbent*, branched; *leaves pinnate;* leaflets 5-9, obovate-oblong, cut-toothed; achenia with a thick appendage at the base. — Banks of the Ohio and Mississippi.

* * *Perennial herbs: petals yellow, longer than the calyx: receptacle flat.*

+- *Low: leaves palmate, of 3 or 5 leaflets.*

3. **P. frígida,** Vill. *Dwarf* (1′-3′ high), tufted, *villous* when young, stems or scapes mostly 1-flowered; *leaflets* 3, *broadly wedge-obovate, deeply cut* into 5-7 oblong approximate teeth. (P. Robbinsiàna, *Oakes.*) — Less villous with age and smaller-flowered than P. frigida of the Alps, but agreeing closer with it than with P. minima, which probably is only another form of the same species. It also occurs in Greenland. (Eu.)

4. **P. Canadénsis,** L. (Common Cinque-foil or Five-Finger.) Hairy or pubescent, *procumbent and ascending, producing runners; peduncles axillary, elongated,* 1-*flowered; leaflets* 5, oblong or obovate-wedge-form, cut-toothed towards the apex. (P. sarmentòsa, *Muhl.*) — Var. 1. pùmila is a dwarf, early-flowering state, in sterile soil. Var. 2. símplex is a taller and greener state, with slender ascending stems. (P. simplex, *Michx.*) — Abounds among grass in dry fields, &c. April-Oct.

5. **P. argéntea,** L. (Silvery Cinque-foil.) Stems ascending, *cymose at the summit, many-flowered,* white-woolly; *leaflets* 5, wedge-oblong, almost pinnatifid, entire towards the base, with revolute margins, green above, *white with silvery wool beneath.* — Dry barren fields, &c. June-Sept. (Eu.)

+- +- *Taller: leaves pinnate, of 3-9 leaflets.*

6. **P. Pennsylvánica,** L. Stems erect, hairy or woolly; cymose at the summit, many-flowered; leaflets 5-9, oblong, obtuse, pinnatifid, silky-woolly with white hairs, especially beneath, the upper ones larger and crowded; petals scarcely longer than the calyx. — Pennsylvania? New Hampshire (Isle of Shoals, *Robbins*), Maine (Cape Elizabeth, *C. J. Sprague*), and northward. July.

§ 2. *Style deeply lateral, attached at or beneath the middle of the ovary: petals yellow or white, deciduous.*

* *Achenia glabrous: style thickened above: receptacle conical in fruit.*

7. **P. argùta,** Pursh. Stem erect and stout (2° – 4° high), brownish hairy, clammy above; leaves pinnate, of 3 – 9 oval or ovate cut-serrate leaflets, downy underneath; flowers cymose-clustered; *petals yellowish or whitish;* disk thick and glandular. — Rocky hills; common northward. July.

* * *Achenia (at least below) and the convex receptacle villous.*

8. **P. Anserìna,** L. (SILVER-WEED.) Herbaceous, *creeping by slender rooting runners; leaves all radical, pinnate; leaflets* 9 – 19, with minute pairs interposed, oblong, pinnatifid-serrate, green and nearly smooth above, *silvery-white with silky down underneath;* stipules many-cleft; *flowers solitary (yellow),* on long scape-like peduncles. Brackish marshes, river-banks, &c., New England to Penn., Wisconsin, and northward. June – Sept. (Eu.)

9. **P. fruticòsa,** L. (SHRUBBY CINQUE-FOIL.) Stem erect, *shrubby* (2° – 4° high), very much branched; *leaves pinnate; leaflets* 5 – 7, closely crowded, oblong-lanceolate, *entire,* silky, especially beneath; stipules scale-like; *flowers numerous (yellow),* terminating the branchlets. — Bog-meadows; same range as the last. June – Sept. (Eu.)

10. **P. tridentàta,** Ait. (MOUNTAIN CINQUE-FOIL.) Stems low (4′ – 6′ high), rather woody at the base, tufted, ascending, cymosely several-flowered; *leaves palmate; leaflets* 3, wedge-oblong, nearly smooth, thick, *coarsely 3-toothed at the apex;* petals white; achenia and receptacle very hairy. — Rocks, on mountains; and in Maine near the level of the sea; shore of Lake Superior and northward. June.

§ 3. *Styles moderately lateral: petals (shorter than the calyx, ovate-lanceolate) and filaments more or less persistent: disk thick and hairy: achenia glabrous: receptacle hairy, convex, at length large and spongy.* (Comarum, *L.*)

11. **P. palùstris,** Scop. (MARSH FIVE-FINGER.) Stems ascending from a creeping base (1° – 2° high); leaves pinnate, of 5 – 7 lanceolate or oblong crowded serrate leaflets, whitish beneath; flowers somewhat cymose; calyx (1′ broad) dark purple inside; petals purple. ♃ (Cómarum palustre, *L.*) — Bogs, N. England to Penn., Wisconsin, and northward. June – Aug. (Eu.)

12. FRAGÀRIA, Tourn. STRAWBERRY.

Flowers nearly as in Potentilla. Styles deeply lateral. Receptacle in fruit much enlarged and conical, becoming pulpy and scarlet, bearing the minute dry achenia scattered over its surface. — Stemless perennials, with runners, and with white cymose flowers on scapes. Leaves radical: leaflets 3, obovate-wedge-form, coarsely serrate. Stipules cohering with the base of the petiole, which with the scapes are usually hairy. (Name from the fragrance of the fruit.) — The two species are indiscriminately called WILD STRAWBERRY.)

1. **F. Virginiàna,** Ehrhart. *Achenia embedded in the deeply pitted receptacle.* — Fields and rocky places; common. April – June. — Scapes commonly shorter than the leaves, which are of a rather coriaceous or firm texture. Fruit roundish-ovoid.

2. **F. vésca,** L. *Achenia superficial on the conical or hemispherical fruiting receptacle* (not sunk in pits). — Fields and rocks, common: indigenous, especially northward. — Leaves thin; the wild fruit often long and slender. (Eu.)

13. DALIBÁRDA, L. DALIBARDA.

Calyx deeply 5 – 6-parted, 3 of the divisions larger and toothed. Petals 5, sessile, deciduous. Stamens many. Ovaries 5 – 10, becoming nearly dry seed-like drupes: styles terminal, deciduous. — Low perennials, with creeping and densely tufted stems or rootstocks, and roundish-heart-shaped crenate leaves on slender petioles. Flowers 1 – 2, white, on scape-like peduncles. (Named in honor of *Dalibard*, a French botanist.)

1. **D. rèpens,** L. Downy; sepals spreading in the flower, converging and enclosing the fruit. — Wooded banks; common northward. June – Aug. — Leaves much like those of a stemless Violet.

14. RÙBUS, L. BRAMBLE.

Calyx 5-parted, without bractlets. Petals 5, deciduous. Stamens numerous. Achenia usually many, collected on a spongy or succulent receptacle, becoming small drupes: styles nearly terminal. — Perennial herbs, or somewhat shrubby plants, with white (rarely reddish) flowers, and edible fruit. (Name from the Celtic *rub*, red.)

§ 1. *Fruit, or collective mass of drupes, falling off whole from the dry receptacle when ripe, or of few grains which fall separately.* (RASPBERRY.)

* *Leaves simple: flowers large: prickles none: fruit and receptacle flattish.*

1. **R. odoràtus,** L. (PURPLE FLOWERING-RASPBERRY.) *Stem shrubby* (3° – 5° high); *branches, stalks, and calyx bristly with glandular clammy hairs;* leaves 3 – 5-lobed, the lobes pointed and minutely toothed, the middle one prolonged; peduncles many-flowered; calyx-lobes tipped with a long narrow appendage; *petals rounded, purple rose-color;* fruit ripening several reddish grains. — Rocky banks, common northward. June – Aug. — Flowers showy, 2′ broad.

2. **R. Nutkànus,** Moçino. (WHITE FLOWERING-RASPBERRY.) *Glandular*, scarcely bristly; leaves almost equally 5-lobed, coarsely toothed; peduncles few-flowered; *petals oval, white.* (R. parviflòrus, *Nutt.*) — Upper Michigan, and northwestward along the Lakes. Much like No. 1; but smaller.

3. **R. Chamæmòrus,** L. (CLOUD-BERRY.) *Herbaceous, low, diœcious; stem simple,* 2 – 3-*leaved,* 1-*flowered;* leaves roundish-kidney-form, somewhat 5-lobed, serrate, wrinkled; calyx-lobes pointless; *petals obovate, white;* fruit of few grains, amber-color. — White Mountains of New Hampshire at the limit of trees: also Lubeck, Maine, and northward. (Eu.)

* * *Leaflets (pinnately)* 3 – 5: *petals small, erect, white.*

+ *Stems annual, herbaceous, not prickly: fruit of few separate grains.*

4. **R. triflòrus,** Richardson. (DWARF RASPBERRY.) Stems ascending (6′ – 12′ high) or trailing; leaflets 3 (or pedately 5), rhombic-ovate or ovate-lanceolate, acute at both ends, coarsely doubly serrate, thin, smooth; peduncle

1-3-flowered. — Wooded hill-sides, Rhode Island to Penn., Wisconsin, and northward. June. — Sepals and petals often 6 or 7.

++ *Stems biennial and woody, prickly: receptacle oblong: fruit hemispherical.*

5. **R. strigòsus,** Michx. (WILD RED RASPBERRY.) *Stems upright*, and with the stalks, &c. *beset with stiff straight bristles* (some of them becoming weak hooked prickles), glandular when young, somewhat glaucous; leaflets 3-5, oblong-ovate, pointed, cut-serrate, whitish-downy underneath; the lateral sessile; petals as long as the sepals; *fruit light red.* — Thickets and hills; common, especially northward. — Fruit ripening from June to Aug., finely flavored, but more tender and watery than the Garden or European Raspberry (*R. Idæus*), which it too closely resembles.

6. **R. occidentàlis,** L. (BLACK RASPBERRY. THIMBLEBERRY.) *Glaucous all over; stems recurved, armed* like the stalks, &c. *with hooked prickles, not bristly;* leaflets 3 (rarely 5), ovate, pointed, coarsely doubly serrate, whitened-downy underneath; the lateral ones somewhat stalked; petals shorter than the sepals; *fruit purple-black.* — Thickets and fields, especially where the ground has been burned over. May. — Fruit ripe early in July, pleasant. (Some curious forms are known, with fruit intermediate between this and the last.)

§ 2. *Fruit, or collective drupes, not separating from the juicy receptacle, mostly ovate or oblong, blackish.* (BLACKBERRY.)

7. **R. villòsus,** Ait. (COMMON or HIGH BLACKBERRY.) Shrubby (1°-6° high), furrowed, *upright or reclining, armed with stout curved prickles;* branchlets, stalks, and lower surface of the leaves *hairy and glandular;* leaflets 3 (or pedately 5), ovate, pointed, unequally serrate; the terminal one somewhat heart-shaped, conspicuously stalked; *flowers racemed, numerous,* bracts short; sepals linear-pointed, much shorter than the obovate-oblong spreading petals. — Var. 1. FRONDÒSUS: smoother and much less glandular; flowers more corymbose, with leafy bracts; petals roundish. Var. 2. HUMIFÙSUS: trailing, smaller; peduncles few-flowered. — Borders of thickets, &c., common. May, June. the pleasant large fruit ripe in Aug. and Sept. — Plant very variable in size, aspect, and shape of the fruit.

8. **R. Canadénsis,** L. (LOW BLACKBERRY. DEWBERRY.) *Shrubby, extensively trailing, slightly prickly;* leaflets 3 (or pedately 5-7), oval or ovate-lanceolate, mostly pointed, thin, *nearly smooth,* sharply cut-serrate; flowers racemed, with leaf-like bracts. (R. triviàlis, *Pursh, Bigel., &c.;* not of *Michx.*) — Rocky or gravelly hills, common. May; ripening its large and sweet fruit earlier than No. 7.

9. **R. hispidus,** L. (RUNNING SWAMP-BLACKBERRY.) *Stems slender, somewhat shrubby, extensively procumbent, beset with small reflexed prickles;* leaflets 3 (or rarely pedately 5), *smooth,* thickish, *mostly persistent,* obovate, obtuse, coarsely serrate, entire towards the base; *peduncles leafless, several-flowered, often bristly; flowers small.* (R. obovàlis, *Michx.* R. sempérvirens and R. setòsus, *Bigelow.*) — Low woods, common northward. June. — Flowering shoots short, ascending, the sterile forming long runners. Fruit of a few large grains, red or purple, sour.

10. **R. cuneifòlius,** Pursh. (SAND BLACKBERRY.) *Shrubby* (1° - 3° high), *upright, armed with stout recurved prickles; branchlets and lower surface of the leaves whitish-woolly;* leaflets 3 - 5, wedge-obovate, thickish, serrate above; peduncles 2 - 4-flowered; *petals large.* — Sandy woods, S. New York to Virginia and southward. May - July; ripening its well-flavored black fruit in August.

11. **R. triviàlis,** Michx. (LOW BUSH-BLACKBERRY.) *Shrubby, procumbent,* bristly and prickly; *leaves evergreen, coriaceous, nearly glabrous;* leaflets 3 (or pedately 5), ovate-oblong or lanceolate, sharply serrate; peduncles 1 - 3-flowered; petals large. — Sandy soil, Virginia and southward. March - May.

15. ROSA, Tourn. ROSE.

Calyx-tube urn-shaped, contracted at the mouth, becoming fleshy in fruit. Petals 5, obovate or obcordate, inserted, with the many stamens, into the edge of the hollow thin disk that lines the calyx-tube and bears the numerous pistils over its inner surface. Ovaries hairy, becoming bony achenia in fruit. — Shrubby and prickly, with odd-pinnate leaves, and stipules cohering with the petiole: stalks, foliage, &c. often bearing aromatic glands. (The ancient Latin name.)

* *Styles cohering in a column, as long as the stamens.*

1. **R. setigera,** Michx. (CLIMBING OR PRAIRIE ROSE.) *Stems climbing, armed with stout nearly straight prickles,* not bristly; *leaflets* 3 - 5, *ovate,* acute, sharply serrate, smooth or downy beneath; stalks and calyx glandular; flowers corymbed; sepals pointed; petals deep rose-color changing to white; fruit (hip) globular. — Borders of prairies and thickets, Ohio to Illinois and southward. July. — A fine species, the only American climbing Rose; the strong shoots growing 10° - 20° in a season.

* * *Styles separate, nearly included in the calyx-tube: petals rose-color.*

2. **R. Carolìna,** L. (SWAMP ROSE.) Stems tall (4° - 7° high), *armed with stout hooked prickles,* not bristly; *leaflets* 5 - 9, elliptical, often acute, *dull above and pale beneath; stipules narrow; flowers numerous, in corymbs;* calyx and peduncles glandular-bristly, the former with leaf-like appendages; fruit (hip) depressed-globular, somewhat bristly. — Low grounds, common. June - Sept.

3. **R. lùcida,** Ehrhart. (DWARF WILD-ROSE.) Stems (1° - 2° high), *armed with unequal bristly prickles,* which are mostly deciduous, the stouter persistent ones *nearly straight,* slender; *leaflets* 5 - 9, *elliptical or oblong-lanceolate, shining above,* sharply serrate; *stipules broad; peduncles* 1 - 3*-flowered,* and with the appendaged calyx-lobes glandular-bristly; fruit depressed-globular, smooth when ripe. — Common in dry soil, or along the borders of swamps. May - July. — R. nítida, *Willd.*, is a smooth and narrow-leaved form.

4. **R. blánda,** Ait. (EARLY WILD-ROSE.) *Nearly unarmed,* or with scattered straight deciduous prickles (1° - 3° high); *leaflets* 5 - 7, *oval or oblong, obtuse, pale on both sides and minutely downy or hoary beneath,* serrate; stipules large; flowers 1 - 3, the *peduncles and calyx-tube smooth and glaucous;* fruit globose, crowned with the persistent erect and connivent entire calyx-lobes. — Rocks and banks, Vermont to Penn. and Wisconsin, chiefly northward. May, June. — Petals light rose-color.

5. **R. rubiginósa**, L. (True Sweet-Brier.) Climbing high; *prickles numerous, the larger ones strong and hooked, and the smaller awl-shaped;* leaflets doubly serrate, rounded at the base; downy and clothed with *fragrant russet glands beneath; fruit pear-shaped or obovate, crowned with the persistent calyx-lobes.* — Road-sides and thickets. June – Aug. (Nat. from Eu.)

6. **R. micrántha**, Smith. (Smaller-fl. Sweet-Brier.) *Prickles uniform and hooked; fruit elliptical and ovate; calyx-lobes deciduous;* flowers smaller: otherwise as No. 5. — E. New England. (Nat. from Eu.)

Suborder III. PÒMEÆ. The Pear Family.

16. CRATÆ̀GUS, L. Hawthorn. White Thorn.

Calyx-tube urn-shaped, the limb 5-cleft. Petals 5, roundish. Stamens many, or only 10 – 5. Styles 1 – 5. Fruit (calyx-tube) fleshy, containing 1 – 5 bony 1-seeded carpels. — Thorny shrubs or small trees, with simple and mostly lobed leaves, and white (rarely rose-colored) blossoms. (Name from κράτος, *strength*, on account of the hardness of the wood.)

* *Corymbs many-flowered.*

+ *Fruit very small, depressed-globose (not larger than peas), bright red: flowers small: calyx-teeth short and broad: styles* 5: *plants glabrous and glandless throughout.*

1. **C. spathulàta**, Michx. *Leaves thickish and shining, spatulate* or oblanceolate, with a *long tapering base, crenate* above, rarely cut-lobed, *nearly sessile.* — Virginia and southward. May. — Shrub 10° – 15° high.

2. **C. cordàta**, Ait. (Washington Thorn.) *Leaves broadly ovate or triangular,* mostly truncate or a little heart-shaped at the base, on a *slender petiole, variously 3 – 5-cleft or cut, and serrate.* — Virginia, Kentucky, and southward. June. — Trunk 15° – 25° high.

+ + *Fruit small (¼′ – ⅓′ long), ovoid, deep red: flowers rather large: styles* 1 – 3.

3. C. Oxyacántha, L. (English Hawthorn.) Smooth; *leaves obovate,* cut-lobed and toothed, *wedge-form* at the base; calyx not glandular. May. — More or less spontaneous as well as cultivated. (Adv. from Eu.)

4. **C. apiifòlia**, Michx. Softly pubescent when young, becoming glabrous; leaves roundish, with a broad truncate or slightly heart-shaped base, pinnately 5 – 7-cleft, with the crowded divisions cut-lobed and sharply serrate; petioles slender; calyx-lobes glandular-toothed, slender. — Virginia and southward. March, April.

+ + + *Fruit large (½′ – ¾′ long), red; flowers large: styles and stones of the fruit even in the same species* 1 – 3 (*when the fruit is ovoid or pear-shaped*) *or* 4 – 5 (*when the fruit is globular*): *stipules, calyx-teeth, bracts, &c. often beset with glands.*

5. **C. coccínea**, L. (Scarlet-fruited Thorn.) *Glabrous throughout; leaves thin,* roundish-ovate, sharply toothed and cut, or somewhat cut-lobed, usually abrupt at the base, on *slender petioles;* flowers white, often with a rosy tinge (¾′ broad); *fruit bright scarlet-red,* ovoid (½′ broad), scarcely edible. — Thickets and rocky banks; common. May. — A low tree.

6. **C. tomentòsa,** L. (Black or Pear Thorn.) *Downy or villous-pubescent*, at least when young, on the peduncles, calyx, and lower side of the leaves; *leaves thickish*, rather large, oval or ovate-oblong, sharply toothed and often cut, abruptly narrowed at the base into a *somewhat margined petiole*, the upper surface more or less furrowed along the veins; flowers large (often 1′ broad), white; *fruit crimson or orange-red*, usually large (⅝′ – ¾′ broad), globular or somewhat pear-shaped, edible. — Thickets; common. May, June. — A tall shrub or low tree, of many varieties, of which the following are the most marked.

Var. **pyrifòlia.** Leaves sparingly pubescent beneath when young, soon glabrous, smooth and shining above, often slightly cut-lobed; fruit large, bright-colored, sparingly dotted, of a pleasant flavor. (C. pyrifòlia, *Ait.*)

Var. **punctàta.** Leaves rather small, mostly wedge-obovate, with a longer tapering and entire base, unequally toothed above, rarely cut, villous pubescent when young, smooth but dull when old, the numerous veins more strongly impressed on the upper surface and prominent underneath; fruit globose, usually dull red and yellowish with whitish dots. (C. punctata, *Jacq.*)

Var. **móllis.** Leaves rounded, abrupt or somewhat heart-shaped at the base, soft-downy both sides, or at least beneath, very sharply doubly-toothed and cut; fruit often downy. (C. subvillosa, *Schrader*. C. coccinea, var.? mollis, *Torr. & Gray.*) — Michigan, Illinois, and southwestward.

7. **C. Crus-gálli,** L. (Cockspur Thorn.) *Glabrous; leaves thick, shining above, wedge-obovate and oblanceolate*, tapering into a very short petiole, serrate above the middle; fruit globular, bright-red (⅜′ broad). — Thickets. June. — Shrub or tree 10° – 20° high, with firm dark green leaves very shining above, and slender sharp thorns often 2′ long. This is our best species for hedges.

* *Corymbs simple few- (1 – 6-) flowered: calyx, bracts, &c. glandular.*

8. **C. flàva,** Ait. (Summer Haw.) Somewhat pubescent or glabrous; *leaves wedge-obovate or rhombic-obovate*, narrowed at the base into a glandular petiole, *unequally toothed and somewhat cut* above the middle, *rather thin*, the teeth, &c. *glandular*; styles 4 – 5; fruit somewhat pear-shaped, yellowish, greenish, or reddish (½′ – ⅝′ broad). — Sandy soil, Virginia and southward. May. — Tree 15° – 20° high, with rather large flowers, 2 – 6 in a corymb.

Var. **pubéscens.** Downy or villous-pubescent when young; leaves thickish, usually obtuse or rounded at the summit. (C. elliptica, *Ait.* C. glandulòsa, *Michx.* C. Virginica, *Lodd.*) — Virginia and southward.

9. **C. parvifòlia,** Ait. (Dwarf Thorn.) Downy; *leaves thick, obovate-spatulate, crenate-toothed* (½′ – 1½′ long), almost sessile, the upper surface at length shining; flowers solitary or 2 – 3 together, on *very short peduncles; calyx-lobes as long as the petals*; styles 5; fruit globular or pear-shaped, greenish-yellow. — Sandy soil, New Jersey to Virginia and southward. May. — Shrub 3° – 6° high.

17. PỲRUS, L. Pear. Apple.

Calyx-tube urn-shaped, the limb 5-cleft. Petals roundish or obovate. Stamens numerous. Styles 2 – 5. Fruit (pome) fleshy or berry-like; the 2 – 5 carpels of a papery or cartilaginous texture, 2-seeded. — Trees or shrubs, with handsome flowers in corymbed cymes. (The classical name of the Pear-tree.)

§ 1. **MÀLUS**, Tourn. — *Leaves simple: cymes simple and umbel-like: fruit fleshy, globular, sunk in at the attachment of the stalk.* (APPLE.)

1. **P. coronària,** L. (AMERICAN CRAB-APPLE.) *Leaves ovate,* often rather heart-shaped, *cut-serrate or lobed,* soon glabrous; *styles woolly and united at the base.* — Glades, W. New York to Wisconsin and southward. May. — Tree 20° high, with few, but very large, rose-colored fragrant blossoms, and translucent, fragrant, greenish fruit.

2. **P. angustifòlia,** Ait. (NARROW-LEAVED CRAB-APPLE.) *Leaves oblong or lanceolate,* often acute at the base, mostly toothed, glabrous; *styles distinct.* — Glades, from Pennsylvania southward. April.

P. MALUS, the APPLE-TREE, is often found in deserted fields and copses.

P. COMMÙNIS, the PEAR-TREE, represents the typical section of the genus.

§ 2. **ADENORÀCHIS**, DC. — *Leaves simple, the midrib beset with glands along the upper side: cymes compound: styles united at the base: fruit berry-like, small.*

3. **P. arbutifòlia,** L. (CHOKE-BERRY.) Leaves oblong or obovate, finely serrate; fruit pear-shaped, or when ripe globular. — Var. 1. ERYTHROCÁRPA has the cyme and leaves beneath woolly, and red or purple fruit. Var. 2. MELANOCÁRPA is nearly smooth, with black fruit. — Damp thickets, common. May, June. — Shrub 2° - 10° high. Flowers white, or tinged with purple.

§ 3. **SÓRBUS**, Tourn. — *Leaves odd-pinnate: cymes compound: styles separate: fruit berry-like, small.*

4. **P. Americàna,** DC. (AMERICAN MOUNTAIN-ASH.) Leaflets 13 - 15, lanceolate, taper-pointed, sharply serrate with pointed teeth, smooth; cymes large and flat. — Swamps and mountain woods, N. England to Wisconsin northward, and along the Alleghanies southward. June. — A slender shrub or low tree, with white blossoms; greatly prized in cultivation for its ornamental clusters of scarlet fruit (not larger than large peas) in autumn and winter.

P. AUCUPÀRIA, Gærtn., the cultivated EUROPEAN MOUNTAIN-ASH or ROWAN-TREE, is known by its paler, shorter, and blunt leaflets, and larger fruit.

18. AMELÁNCHIER, Medic. JUNE-BERRY.

Calyx 5-cleft. Petals oblong, elongated. Stamens numerous, short. Styles 5, united below. Fruit (pome) berry-like, the 5 cartilaginous carpels each divided into 2 cells by a partition from the back; the divisions 1-seeded. — Small trees or shrubs, with simple sharply serrated leaves, and white flowers in racemes. (*Amelancier* is the popular name of A. vulgaris in Savoy.)

1. **A. Canadénsis,** Torr. & Gray. (SHAD-BUSH. SERVICE-BERRY.) Calyx-lobes triangular-lance-form; fruit globular, purplish, edible (sweet, ripe in June). — Along streams, &c.: common, especially northward. April, May. — Varies exceedingly; the leading forms are, —

Var. **Botryàpium**; a tree 10° - 30° high, nearly or soon glabrous; leaves ovate-oblong, sometimes heart-shaped at the base, pointed, very sharply serrate; flowers in long drooping racemes; the oblong petals 4 times the length of the calyx. (Pyrus Botryapium, *Willd.*)

Var. **oblongifòlia**; a smaller tree or shrub; leaves oblong, beneath, like the branchlets, white-downy when young; racemes and petals shorter.

Var. **rotundifòlia**; with broader leaves and smaller petals than in the first variety; racemes 6–10-flowered.

Var. **alnifòlia**; shrub, with the roundish leaves blunt or notched at both ends, serrate towards the summit; racemes dense and many-flowered. — Chiefly in the Western States, and westward.

Var. **oligocárpa**; shrub, with thin and smooth narrowly oblong leaves, 2–4-flowered racemes, the broader petals scarcely thrice the length of the calyx. — Cold and deep mountain swamps, northward.

CYDÒNIA VULGARIS, the QUINCE, and C. JAPÓNICA, the LOQUAT, or JAPAN QUINCE, differ from the order generally in their many-seeded carpels.

ORDER 40. CALYCANTHÀCEÆ. (CAROLINA-ALLSPICE FAMILY.)

Shrubs with opposite entire leaves, no stipules, the sepals and petals similar and indefinite, the anthers adnate and extrorse, and the cotyledons convolute: — otherwise like Rosaceæ. Chiefly represented by the genus

1. CALYCÁNTHUS, L. CAROLINA ALLSPICE. SWEET-SCENTED SHRUB.

Calyx of many sepals, united below into a fleshy inversely conical cup (with some leaf-like bractlets growing from it); the lobes lanceolate, mostly colored like the petals; which are similar, in many rows, thickish, inserted on the top of the closed calyx-tube. Stamens numerous, inserted just within the petals, short; some of the inner ones sterile (destitute of anthers). Pistils several or many, enclosed in the calyx-tube, inserted on its base and inner face, resembling those of the Rose. Fruit like a rose-hip, but dry when ripe, and larger, enclosing the large achenia. — Shrubs, with opposite entire leaves, and large lurid-purple flowers terminating the leafy branches. Bark and foliage aromatic; the crushed flowers exhaling more or less the fragrance of strawberries. (Name composed of κάλυξ, *a cup or calyx,* and ἄνθος, *flower,* from the closed cup which contains the pistils.)

1. **C. flóridus,** L. *Leaves oval, soft-downy underneath.* — Virginia? and southward, on hill-sides in rich soil. Common in gardens. April – Aug.

2. **C. lævigàtus,** Willd. *Leaves oblong,* thin, either blunt or taper pointed, *bright green and glabrous* or nearly so on both sides, or rather pale beneath; flowers smaller. — Mountains of Franklin Co., Penn. (*Prof. Porter*), and southward along the Alleghanies. May – Aug.

3. **C. glaùcus,** Willd. *Leaves* oblong-ovate or ovate-lanceolate; *conspicuously taper-pointed, glaucous-white beneath,* roughish above, glabrous, larger than in the others (4′ – 7′ long); the flowers also larger. — Virginia? near the mountains and southward. May – Aug.

ORDER 41. MELASTOMÀCEÆ. (MELASTOMA FAMILY.)

Myrtle-like plants, with opposite ribbed leaves, and anthers opening by pores at the apex; otherwise much as in the Evening-Primrose Family. — All tropical, except the genus

1. RHÉXIA, L. DEER-GRASS. MEADOW-BEAUTY.

Calyx-tube urn-shaped, coherent with the ovary below, and continued above it, persistent, 4-cleft at the apex. Petals 4, convolute in the bud, oblique, inserted, along with the 8 stamens, on the summit of the calyx-tube. Anthers long, 1-celled, inverted in the bud. Style 1: stigma 1. Pod invested by the permanent calyx, 4-celled, with 4 many-seeded placentæ projecting from the central axis. Seeds coiled like a snail-shell, without albumen. — Low perennial herbs, often bristly, with sessile 3 – 5-nerved and bristle-edged leaves, and large showy cymose flowers; the petals falling early. (Name from ῥῆξις, *a rupture*, applied to this genus for no obvious reason.)

* *Anthers linear, curved, with a minute spur on the back at the attachment of the filament above its base: flowers cymose, peduncled.*

1. **R. Virgínica,** L. *Stem square,* with wing-like angles; *leaves oval-lanceolate, acute;* petals bright purple. — Sandy swamps, Massachusetts along the coast, to Virginia, Ohio, and southward. July.

2. **R. Mariàna,** L. *Stems cylindrical; leaves linear-oblong,* narrowed below; petals paler. — Sandy swamps, N. Jersey, Kentucky, and southward.

* * *Anthers oblong, straight, without any spur: flowers few, sessile.*

3. **R. ciliòsa,** Michx. Stem square, glabrous; leaves broadly ovate, ciliate with long bristles; calyx glabrous. — Maryland and southward.

ORDER 42. LYTHRÀCEÆ. (LOOSESTRIFE FAMILY.)

Herbs, with mostly opposite entire leaves, no stipules, the calyx enclosing, but free from, the 1 – 4*-celled many-seeded ovary and membranous pod, and bearing the* 4 – 7 *deciduous petals and* 4 – 14 *stamens on its throat; the latter lower down. Style* 1: *stigma capitate, or rarely 2-lobed.* — Flowers axillary or whorled, rarely irregular. Petals sometimes wanting. Pod often 1-celled by the early breaking away of the thin partitions: placentæ in the axis. Seeds anatropous, without albumen. — Branches usually 4-sided.

Synopsis.

* Flowers regular, or very nearly so.

1. AMMANNIA. Calyx short, 4-angled, not striate. Petals 4, or none. Stamens 4.
2. LYTHRUM. Calyx tubular-cylindrical, striate. Petals 4 – 7. Stamens 5 – 14.
3. NESÆA. Calyx short-campanulate. Stamens 10 – 14, exserted, mostly unequal.

* * Flowers irregular: petals unequal.

4. CUPHEA. Calyx spurred or enlarged on one side at the base. Stamens 12.

1. AMMÁNNIA, Houston. AMMANNIA.

Calyx globular or bell-shaped, 4-angled, 4-toothed, with a little horn-shaped appendage at each sinus. Petals 4 (purplish), small and deciduous, sometimes wanting. Stamens 4, short. Pod globular, 4-celled. — Low and inconspicuous smooth herbs, with opposite narrow leaves, and small greenish flowers in their axils. (Named after *Ammann*, a Russian botanist anterior to Linnæus.)

1. **A. hùmilis,** Michx. *Leaves lanceolate or linear-oblong, tapering into a slight petiole,* or the base somewhat arrow-shaped; flowers solitary or 3 together in the axils of the leaves, sessile; style very short. ① — Low and wet places, from Connecticut and Michigan southward. July – Sept.

2. **A. latifòlia,** L. *Leaves linear-lanceolate* (2′ – 3′ long), *with a broad auricled sessile base;* style mostly slender. ① — Ohio, Illinois, and southward.

2. LỲTHRUM, L. LOOSESTRIFE.

Calyx cylindrical, striate, 4 – 7-toothed, with as many little processes in the sinuses. Petals 4 – 7. Stamens as many as the petals or twice the number, inserted low down on the calyx, commonly nearly equal. Pod oblong, 2-celled. — Slender herbs, with opposite or scattered mostly sessile leaves, and purple (rarely white) flowers. (Name from λύθρον, *blood;* perhaps from the crimson blossoms of some species.)

* *Stamens and petals* 5 – 7 : *flowers small, solitary and nearly sessile in the axils of the mostly scattered upper leaves: proper calyx-teeth often shorter than the intermediate processes : plants smooth.*

1. **L.** HYSSOPIFÒLIA, L. Low (6′ – 10′ high), pale; *leaves oblong-linear, obtuse, longer than the inconspicuous flowers;* petals (pale purple) 5 – 6. ① — Marshes, coast of Massachusetts, &c. (Nat. from Eu.?)

2. **L. alàtum,** Pursh. Tall and wand-like; branches with *margined angles; leaves varying from oblong-ovate to lanceolate, the upper not longer than the flowers;* petals (deep purple) 6. ♃ — Michigan, Wisconsin, and southward.

3. **L. lineàre,** L. Stem slender and tall, bushy at the top, *two of the angles margined; leaves linear, short, chiefly opposite,* obtuse, or the upper acute and scarcely exceeding the flowers; calyx obscurely striate; petals (whitish) 6. ♃ — Brackish marshes, N. Jersey and southward. Aug. — Stem 3° – 4° high.

* * *Stamens* 12 – 14, *twice the number of the petals, half of them sometimes much shorter: flowers large, crowded and whorled in an interrupted wand-like spike.*

4. **L. Salicària,** L. (SPIKED LOOSESTRIFE.) Leaves lanceolate, heart-shaped at the base, sometimes whorled in threes. — Wet meadows, Eastern New England, and Orange County, New York: also cultivated. July. — Plant more or less downy, tall: flowers large, purple. (Eu.)

3. NESÆA, Commerson, Juss. SWAMP LOOSESTRIFE.

Calyx short, broadly bell-shaped or hemispherical, with 5 – 7 erect teeth and as many longer and spreading horn-like processes at the sinuses. Petals 5. Stamens 10 – 14, exserted. Pod globose, 3 - 5-celled. — Perennial herbs or slightly shrubby plants, with opposite or whorled leaves, and axillary flowers.

1. **N. verticillàta,** H. B. K. Smooth or downy; stems recurved (2° - 8° long), 4 - 6-sided; leaves lanceolate, nearly sessile, opposite or whorled, the upper with clustered flowers in their axils on short pedicels; petals 5, wedge-lanceolate, rose-purple (½' long); stamens 10, half of them shorter. (Décodon verticillatum, *Gmelin.*) — Swampy grounds, common. July - Sept.

4. CÙPHEA, Jacq. CUPHEA.

Calyx tubular, 12-ribbed, somewhat inflated below, gibbous or spurred at the base on the upper side, 6-toothed at the apex, and usually with as many little processes in the sinuses. Petals 6, very unequal. Stamens mostly 12, approximate in 2 sets, included, unequal. Ovary with a curved gland at the base next the spur of the calyx, 1 - 2-celled: style slender: stigma 2-lobed. Pod oblong, few-seeded, early ruptured through one side. — Flowers solitary, stalked. (Name from κυφός, *gibbous*, from the shape of the calyx, &c.)

1. **C. viscosissima,** Jacq. (CLAMMY CUPHEA.) Annual, very viscid-hairy, branching; leaves ovate-lanceolate; petals ovate, short-clawed, purple. — Dry fields, New York to Penn., Kentucky, and southward. Aug. — Seeds flat, borne on one side of the placenta, which is early forced out the pod.

ORDER 43. ONAGRÀCEÆ. (EVENING-PRIMROSE FAMILY.)

Herbs, with 4-merous (sometimes 2 - 3-merous) flowers; the tube of the calyx cohering with the 2 - 4-celled ovary, its lobes valvate in the bud, or obsolete, the petals convolute in the bud, and the stamens as many or twice as many as the petals or calyx-lobes. — There are two suborders, viz.: —

SUBORDER I. ONAGRACEÆ PROPER.

Calyx-tube often prolonged beyond the ovary; the petals (rarely wanting) and stamens inserted on its summit. Pollen-grains connected by cobwebby threads. Style single, slender: stigma 2 - 4-lobed or capitate. Pod loculicidally 4-celled and 4-valved, or indehiscent: placentæ in the axis. Seeds anatropous, no albumen.

1. EPILOBIUM. Stamens 8. Petals 4. Seeds with a large downy tuft at the apex.
2. ŒNOTHERA. Stamens 8. Petals 4. Calyx-tube prolonged. Seeds naked, numerous.
3. GAURA. Stamens 8. Petals 4 Calyx-tube prolonged. Pod 1 - 4-seeded, indehiscent.
4. JUSSIÆA. Stamens 8 - 12. Petals 4 - 6. Calyx-tube not prolonged. Pod many-seeded.
5. LUDWIGIA. Stamens 4. Petals 4, or none. Calyx and pod as in No. 4.
6. CIRCÆA. Stamens 2. Petals 2. Calyx slightly prolonged. Pod 1 - 2-celled, 1 - 2-seeded

SUBORDER II. HALORAGEÆ.

Calyx-tube not at all prolonged beyond the ovary, the lobes obsolete. Petals often none. Stamens 1 - 8. Fruit indehiscent, 1 - 4-celled, with a solitary suspended seed in each cell. Albumen thin. — Aquatic plants, with very small axillary sessile flowers, often monœcious or diœcious.

7. PROSERPINACA. Stamens 3. Fruit 3-sided, 3-celled. Flowers perfect.
8. MYRIOPHYLLUM. Stamens 4 - 8. Fruit 4-angled, 4-celled. Flowers monœcious.
9. HIPPURIS. Stamen 1. Fruit 1-celled. Style slender. Flowers perfect.

SUBORDER I. ONAGRÀCEÆ PROPER.

1. EPILÒBIUM, L. WILLOW-HERB.

Calyx-tube not prolonged beyond the ovary; limb 4-cleft, deciduous. Petals 4. Stamens 8: anthers short. Pod linear, many-seeded. Seeds with a tuft of long hairs at the end. — Perennials, with nearly sessile leaves, and violet, purple, or white flowers. (Name composed of ἐπὶ λοβοῦ ἴον, viz. *a violet on a pod.*)

* *Flowers large in a long spike or raceme: petals widely spreading, on claws: stamens and style turned to one side: stigma with 4 long lobes: leaves scattered.*

1. **E. angustifòlium,** L. GREAT WILLOW-HERB.) Stem simple, tall (4° – 7°); leaves lanceolate. — Low grounds, especially in newly cleared land; common northward. July. — Flowers pink-purple, very showy. (Eu.)

* * *Flowers small, corymbed or panicled: petals, stamens, and style erect: stigma club-shaped: lower leaves opposite, entire or denticulate.*

2. **E. alpìnum,** L. *Low* (2′ – 6′ high); *nearly glabrous; stems ascending from a stoloniferous base, simple;* leaves elliptical or ovate-oblong, obtuse, nearly entire, on short petioles; flowers few or solitary, drooping in the bud; petals purple; pods long, glabrous. — Alpine summits of the White Mountains of New Hampshire, and Adirondack Mountains, New York. (Eu.)

Var. **màjus,** Wahl. Taller; upper leaves more or less acute and toothed; pod glabrous or somewhat pubescent. (E. alsinifolium, *Vill.* E. origanifolium, *Lam.*) — With the typical form. (Eu.)

3. **E. palùstre,** L., var. **lineàre.** *Erect* and slender (1° – 2° high), branched above, *minutely hoary-pubescent;* stem roundish; *leaves narrowly-lanceolate or linear,* nearly entire; flower-buds somewhat nodding; petals purplish or white; pods hoary. (E. lineare, *Muhl.* E. squamatum, *Nutt.*) — Bogs, N. England to Penn., Wisconsin, and northward. There is also a small and simple 1 – few-flowered form (4′ – 9′ high), less hoary or nearly glabrous, with shorter leaves (E. oligánthum, *Michx.*), found in N. New York, White Mountains of New Hampshire and northward. This is E. nutans, *Sommerf.* & E. lineare, *Fries,* but the pods are usually a little hoary. (Eu.)

4. **E. mòlle,** Torr. *Soft-downy all over,* strictly erect (1° – 2½° high), at length branching; *leaves crowded; linear-oblong or lanceolate, blunt,* mostly petioled; petals rose-color, notched (2″ – 3″ long). — Bogs, Rhode Island and Penn to Michigan, and northward. Sept.

5. **E. coloràtum,** Muhl. *Glabrous* or nearly so; stem roundish, not angled, much branched (1° – 3° high), many-flowered; *leaves lanceolate or ovate-oblong,* acute, denticulate, *often petioled,* not at all decurrent, thin, usually purple-veined; flower-buds erect; petals purplish, 2-cleft at the summit (1½″ – 2″ long). — Wet places; common. July – Sept.

2. ŒNOTHÈRA, L. EVENING PRIMROSE.

Calyx-tube prolonged beyond the ovary, deciduous; the lobes 4, reflexed. Petals 4. Stamens 8: anthers mostly linear. Pod 4-valved, many-seeded.

Seeds naked. — Leaves alternate. (Name from οἶνος, *wine*, and θήρα, *a chase*: the application uncertain.)

§ 1. *Annuals or biennials: flowers nocturnal, odorous, withering the next day: pods cylindrical, closely sessile.*

1. **Œ. biénnis,** L. (COMMON EVENING-PRIMROSE.) *Erect*, mostly hairy; leaves ovate-lanceolate, acute, obscurely toothed; flowers in a terminal rather leafy spike; calyx-tube much prolonged; *petals inversely heart-shaped* (light yellow); *pods oblong*, somewhat tapering above. — Varies greatly; as Var. 1. MURICÀTA, with rough-bristly stem and pods, and petals rather longer than the stamens. Var. 2. GRANDIFLÒRA, with larger and more showy petals. Var. 3. PARVIFLÒRA, with petals about the length of the stamens. Var. 4. CRUCIÀTA, with singularly small and narrow linear-oblong petals, shorter than the stamens, and smooth pods. — Common everywhere. June – Sept.

2. **Œ. rhombipétala,** Nutt. *Petals rhombic-ovate, acute;* calyx-tube very slender; pods short, cylindrical: otherwise resembling a smoothish and narrow-leaved state of No. 1. — Wisconsin (*Dr. Parry*) and southwestward.

3. **Œ. sinuàta,** L. Hairy, low, *ascending*, or at length procumbent; leaves oblong or lanceolate, sinuate-toothed, often pinnatifid, the lower petioled; flowers (small) axillary; petals not longer than the stamens (pale yellow, rose-color in fading); *pods cylindrical, elongated.* — Sandy fields, New Jersey and southward, principally a dwarf state. June.

§ 2. *Biennials or perennials: flowers diurnal (opening in sunshine), yellow: pods club-shaped, with 4 strong or winged angles and 4 intermediate ribs.*

4. **Œ. glaùca,** Michx. Very glabrous, *glaucous; leaves ovate* or ovate-lanceolate; *pods* obovoid-oblong, 4-*winged, almost sessile.* ♃ — Mountains of Virginia, Kentucky, and southward. May – July. — Leaves broader and flowers larger than in the next.

5. **Œ. fruticòsa,** L. (SUNDROPS.) Hairy or nearly smooth; *leaves lanceolate or oblong;* raceme corymbed, naked below; petals broadly obcordate, longer than the calyx-lobes and stamens; *pods oblong-club-shaped,* 4-*winged, longer than the pedicels.* ♃ — Open places, from New York southward and westward. June – Aug. — Plant 1° – 3° high, with several varieties. Corolla 1½′ broad.

6. **Œ. ripària,** Nutt. Scarcely pubescent; *leaves linear-lanceolate, elongated,* tapering below and somewhat stalked; flowers (large) in a rather leafy at length elongated raceme; petals slightly obcordate; *pods oblong-club-shaped, slender-pedicelled, scarcely* 4-*winged.* ② — River-banks and swamps; Quaker Bridge, New Jersey, to Virginia and southward.

7. **Œ. lineàris,** Michx. Slender, minutely hoary-pubescent; *leaves linear;* flowers (rather large) somewhat corymbed at the end of the branches, *pods obovate, hoary, scarcely* 4-*winged at the summit, tapering into a slender pedicel.* — Montauk Point, Long Island, to Virginia and southward. June. — Plant 1° high, bushy-branched: flowers 1′ wide.

8. **Œ. chrysántha,** Michx. Slender, smooth or pubescent; *leaves lanceolate,* rather blunt; flowers crowded or at first corymbed; *petals obovate, notched at the end (orange-yellow),* longer than the stamens; *pods all pedicelled, oblong-club-*

shaped, scarcely wing-angled. ②? — Banks, Oswego, New York, to Michigan and northward. July. — Stem 12′ - 15′ high; flowers larger than in No. 9, from which it may not be distinct.

9. **Œ. pùmila,** L. Almost smooth, small; *leaves lanceolate or oblanceolate,* mostly obtuse; flowers in a loose and prolonged leafy raceme; *petals obcordate* (*pale yellow*) scarcely longer than the stamens; *pods almost sessile,* oblong-club-shaped, strongly wing-angled. ② or ♃? — Dry fields, common northward, and southward along the Alleghanies. June. — Stems mostly simple, 5′ - 12′ high: the corolla ½′ broad.

3. GAÙRA, L. Gaura.

Calyx-tube much prolonged beyond the ovary, deciduous; the lobes 4 (rarely 3), reflexed. Petals clawed, unequal or turned to the upper side. Stamens mostly 8, often turned down, as also the long style. Stigma 4-lobed. Fruit hard and nut-like, 3 - 4-ribbed or angled, indehiscent or nearly so, usually becoming 1-celled and 1 - 4-seeded. Seeds naked. — Leaves alternate, sessile. Flowers rose-color or white, changing to reddish in fading, in wand-like spikes or racemes; in our species quite small (so that the name, from γαῦρος, *superb,* does not appear very appropriate).

1. **G. biénnis,** L. *Soft-hairy or downy* (3° - 8° high); *leaves oblong-lanceolate,* acute, denticulate; *fruit* oval or oblong, *nearly sessile,* ribbed. ② — Dry banks, from New York westward and southward; common. Aug.

2. **G. fílipes,** Spach. *Nearly smooth;* stem slender (2° - 4° high); *leaves linear,* mostly toothed, tapering at the base; branches of the panicle very slender, naked; *fruit* obovate-club-shaped, 4-angled at the summit, *slender-pedicelled.* — Open places, from Ohio westward and southward. Aug.

4. JUSSIÆA, L. Jussiæa.

Calyx-tube elongated, not at all prolonged beyond the ovary; the lobes 4 - 6, herbaceous and persistent. Petals 4 - 6. Stamens twice as many as the petals. Pod 4 - 6-celled, usually long, opening between the ribs. Seeds very numerous. — Herbs with mostly entire and alternate leaves, and axillary yellow flowers. (Dedicated to *Bernard de Jussieu,* the founder of the Natural System of Botany as further developed by his illustrious nephew.)

1. **J. decúrrens,** DC. Glabrous; stem erect (1° - 2° high), branching, winged by the decurrent lanceolate leaves; calyx-lobes 4, as long as the petals; stamens 8; pod oblong-club-shaped, wing-angled. ♃ — Wet places, Virginia, Illinois, and southward. June - Aug.

5. LUDWÍGIA, L. False Loosestrife.

Calyx-tube not at all prolonged beyond the ovary; the lobes 4, usually persistent. Petals 4, often small or wanting. Stamens 4. Pod short or cylindrical, many-seeded. Seeds minute, naked. — Perennial herbs, with axillary (rarely capitate) flowers. (Named in honor of *Ludwig,* Professor of Botany at Leipsic, contemporary with Linnæus.)

* *Leaves alternate, sessile: flowers peduncled: petals yellow, about equalling the calyx.*

1. **L. alternifòlia,** L. (SEED-BOX.) *Smooth* or nearly so, branched (3° high); *leaves lanceolate, acute or pointed at both ends;* pods cubical, rounded at the base, wing-angled. — Swamps; common southward and near the coast. Aug. — Pods opening first by a hole at the end where the style falls off, afterwards splitting in pieces.

2. **L. hirtélla,** Raf. *Hairy* all over; stems nearly simple (1° - 2° high); *leaves ovate-oblong,* or the upper lanceolate, *blunt at both ends;* pods nearly as in the last, but scarcely wing-angled. — Moist pine barrens, New Jersey to Virginia, and southward. June - Sept.

* * *Leaves alternate, sessile: flowers sessile: petals minute or none.*

3. **L. sphærocárpa,** Ell. Nearly smooth, much branched (1° - 3° high); leaves lanceolate, acute, tapering at the base; *flowers solitary, without bractlets;* petals mostly wanting; *pods globular, not longer than the calyx-lobes,* very small. — Wet swamps, Massachusetts (Tewksbury, *Greene*), New York (Peekskill, *R. I. Browne*), New Jersey, and thence southward.

4. **L. polycárpa,** Short & Peter. Smooth, much branched; leaves narrowly lanceolate, acute at both ends; *flowers often clustered* in the axils, without petals; *bractlets on the base of the 4-sided top-shaped pod,* which is longer than the calyx-lobes. — Swamps, Michigan, Indiana, and Kentucky. Aug. — Stem 1° - 3° high, sometimes with runners.

5. **L. lineàris,** Walt. Smooth, slender (1° high), often branched, with narrow lanceolate or linear leaves; bearing short runners with obovate leaves; *flowers solitary, usually with (greenish-yellow) petals; bractlets minute; pods elongated top-shaped, 4-sided, much longer than the calyx.* — Bogs, pine barrens of New Jersey and southward. Aug.

* * * *Leaves opposite, petioled: flowers sessile: petals none or small.* (Isnárdia, *L.*)

6. **L. palústris,** Ell. (WATER PURSLANE.) Smooth, low; stems procumbent, rooting or floating; leaves ovate or oval, tapering into a slender petiole; calyx-lobes very short; pods oblong, 4-sided, not tapering at the base. (Isnardia palustris, *L.*) — Ditches, common. July - Oct. — Petals rarely present, small and reddish when the plant grows out of water. (Eu.)

* * * * *Leaves opposite, sessile: flowers long-peduncled: petals exceeding the calyx.*

7. **L. arcuàta,** Walt. Smooth, small and creeping; leaves oblanceolate; flowers solitary, yellow (½′ broad); peduncles ½′ - 1′ long; pods oblong-club-shaped somewhat curved (½′ long). — Swamps, Eastern Virginia and southward. May.

6. CIRCÆA, Tourn. ENCHANTER'S NIGHTSHADE.

Calyx-tube slightly prolonged, the end filled by a cup-shaped disk, deciduous; lobes 2, reflexed. Petals 2, inversely heart-shaped. Stamens 2. Pod obovate, 1 - 2-celled, bristly with hooked hairs: cells 1-seeded. — Low and inconspicuous perennials, with opposite thin leaves on slender petioles, and small whitish flowers in racemes. (Named from *Circe,* the enchantress.)

1. **C. Lutetiàna,** L. *Stem mostly pubescent* (1° – 2° high); *leaves ovate,* pointed, slightly toothed; *bracts none;* hairs of the *roundish 2-celled fruit* bristly. — Moist woodlands. July. (Eu.)

2. **C. alpìna,** L. *Low* (3′ – 8′ high), *smooth and weak; leaves heart-shaped, thin, shining, coarsely toothed; bracts minute;* hairs of the obovate-oblong 1-*celled fruit* soft and slender. — Cold woods; common northward. July. (Eu.)

SUBORDER II. HALORÀGEÆ. THE WATER-MILFOIL FAMILY.

7. PROSERPINÀCA, L. MERMAID-WEED.

Calyx-tube 3-sided, the limb 3-parted. Petals none. Stamens 3. Stigmas 3, cylindrical. Fruit bony, 3-angled, 3-celled, 3-seeded, nut-like. — Low, perennial herbs, with the stems creeping at the base (whence the name, from *proserpo,* to creep), alternate leaves, and small perfect flowers sessile in the axils, solitary or 3 – 4 together.

1. **P. palústris,** L. *Leaves lanceolate, sharply serrate,* the lower pectinate when under water; fruit sharply angled. — Wet swamps. June – Aug.

2. **P. pectinàcea,** Lam. *Leaves all pectinate,* the divisions linear-awl-shaped; fruit rather obtusely angled. — Sandy swamps, near the coast.

8. MYRIOPHÝLLUM, Vaill. WATER-MILFOIL.

Flowers monœcious or polygamous. Calyx of the sterile flowers 4-parted, of the fertile 4-toothed. Petals 4, or none. Stamens 4 – 8. Fruit nut-like, 4-celled, deeply 4-lobed: stigmas 4, recurved. — Perennial aquatics. Leaves crowded, often whorled; those under water pinnately parted into capillary divisions. Flowers sessile in the axils of the upper leaves, produced above water; the uppermost staminate. (Name from *μυρίος, a thousand,* and *φύλλον, a leaf,* i. e. Milfoil.)

* *Stamens* 8: *petals deciduous: carpels even: leaves whorled in threes.*

1. **M. spicàtum,** L. Leaves all pinnately parted and capillary, except the *floral ones or bracts;* these are *ovate, entire or toothed, and chiefly shorter than the flowers,* which thus appear to form an interrupted leafless spike. — Deep water, common. July, Aug. (Eu.)

2. **M. verticillàtum,** L. *Floral leaves much longer than the flowers, pectinate-pinnatifid:* otherwise nearly as No. 1. — Ponds, &c. northward. (Eu.)

* * *Stamens* 4: *petals rather persistent: carpels* 1 – 2-*ridged and roughened on the back: leaves whorled in fours and fives, the lower with capillary divisions.*

3. **M. heterophýllum,** Michx. Stem stout; *floral leaves ovate and lanceolate,* thick, crowded, sharply serrate, the lowest pinnatifid; *fruit obscurely roughened.* — Lakes and rivers, from N. New York westward and southward.

4. **M. scabràtum,** Michx. Stem rather slender; lower leaves pinnately parted with few capillary divisions; *floral leaves linear* (rarely scattered), *pectinate-toothed or cut-serrate: carpels strongly 2-ridged and roughened on the back.* — Shallow ponds, from Rhode Island and Ohio southward.

** * * Stamens 4: petals rather persistent: carpels even on the back: leaves chiefly scattered, or wanting on the flowering stems.*

5. **M. ambiguum,** Nutt. *Immersed leaves pinnately parted* into about 10 very delicate capillary divisions; the *emerging ones pectinate, or the upper floral linear* and sparingly toothed or entire; *flowers mostly perfect;* fruit (minute) smooth. — Var. 1. NÀTANS: stems floating, prolonged. Var. 2. CAPILLÀCEUM: stems floating, long and very slender; leaves all immersed and capillary. Var. 3. LIMÒSUM: small, rooting in the mud; leaves all linear, incised, toothed, or entire. — Ponds and ditches, Massachusetts to New Jersey, Penn., and southward, near the coast. July - Sept.

6. **M. tenéllum,** Bigelow. *Flowering stems nearly leafless and scape-like,* (3′ - 10′ high), erect, simple; the sterile shoots creeping and tufted; bracts small, entire; *flowers alternate, monœcious;* fruit smooth. — Borders of ponds, N. New York, New England, and northward. July.

9. HIPPÙRIS, L. MARE'S-TAIL.

Calyx entire. Petals none. Stamen 1, inserted on the edge of the calyx. Style single, thread-shaped, stigmatic down one side, received in the groove between the lobes of the large anther. Fruit nut-like, 1-celled, 1-seeded. — Perennial aquatics, with simple entire leaves in whorls, and minute flowers sessile in the axils, perfect or polygamous. (Name from ἵππος, *a horse*, and οὐρά, *a tail.*)

1. **H. vulgàris,** L. Leaves in whorls of 8 or 12, linear, acute. — Ponds and springs, New York to Kentucky and northward: rare. Stems simple, 1° - 2° high. Flowers very inconspicuous. (Eu.)

ORDER 44. LOASÀCEÆ. (LOASA FAMILY.)

Herbs, with a rough or stinging pubescence, no stipules, the calyx-tube adherent to a 1-celled ovary with 2 or 3 parietal placentæ: — represented only by the genus

1. MENTZÈLIA, Plum. (BARTÒNIA, Nutt.)

Calyx-tube cylindrical or club-shaped; the limb 5-parted, persistent. Petals 5 or 10, regular, spreading, flat, convolute in the bud, deciduous. Stamens indefinite, rarely few, inserted with the petals on the throat of the calyx. Styles 3, more or less united into one: stigmas terminal, minute. Pod at length dry and opening irregularly, few - many-seeded. Seeds flat, anatropous, with little albumen. — Stems erect. Leaves alternate. Flowers terminal, solitary or cymose-clustered. (Dedicated to *C. Mentzel,* an early German botanist.)

1. **M. oligospérma,** Nutt. Rough and adhesive (1° - 3° high), much branched, the brittle branches spreading; leaves ovate and oblong, cut-toothed or angled; flowers yellow (7″ - 10″ broad), opening in sunshine; petals wedge-oblong, pointed; stamens 20 or more: filaments filiform: pod small, about 9-seeded. ① ♃ — Prairies and plains, Illinois and southwestward.

ORDER 45. CACTÀCEÆ. (CACTUS FAMILY.)

Fleshy and thickened mostly leafless plants, of peculiar aspect, globular, or columnar and many-angled, or flattened and jointed, usually with prickles. Flowers solitary, sessile; the sepals and petals numerous, imbricated in several rows, adherent to the 1-celled ovary. — Stamens numerous, with long and slender filaments, inserted on the inside of the tube or cup formed by the union of the sepals and petals. Style 1: stigmas numerous. Fruit a 1-celled berry, with numerous campylotropous seeds on several parietal placentæ. Albumen little or none. — Represented east of the Mississippi only by

1. OPÚNTIA, Tourn. PRICKLY PEAR. INDIAN FIG.

Sepals and petals not united into a prolonged tube, spreading, regular, the inner roundish. Berry often prickly. Seeds with albumen. Cotyledons large, foliaceous in germination. — Stem composed of joints, bearing very small awl-shaped and usually deciduous leaves arranged in a spiral order, with clusters of barbed bristles and often spines also in their axils. Flowers yellow, opening in sunshine for more than one day. (A name of Theophrastus, originally belonging to some different plant.)

1. **O. vulgàris,** Mill. (Cactus Opuntia, *L.*) Low, prostrate-spreading, pale, with flat and broadly obovate joints; the minute leaves ovate-subulate and appressed; the axils bristly, rarely with a few small spines; flowers sulphur-yellow; berry nearly smooth, eatable. — Sandy fields and dry rocks, from Nantucket, Mass. southward, usually near the coast. June.

Var.? **Rafinésquii.** Larger, dark green, mostly spiny, with spreading and awl-shaped leaves. O. Rafinesquii, *Engelm.* — Illinois and southward, and probably in Virginia.

ORDER 46. GROSSULÀCEÆ. (CURRANT FAMILY.)

Low shrubs, sometimes prickly, with alternate and palmately-lobed leaves, a 5-lobed calyx cohering with the 1-celled ovary, and bearing 5 stamens alternating with as many small petals. Fruit a 1-celled berry, with 2 parietal placentæ, crowned with the shrivelled remains of the calyx. Seeds numerous, anatropous, with a gelatinous outer coat, and a minute embryo at the base of hard albumen. Styles 2, distinct or united. — Leaves mostly plaited in the bud, often clustered in the axils, the small flowers from the same clusters, or from separate lateral buds. — Comprises only the genus

1. RÌBES, L. CURRANT. GOOSEBERRY.

Character same as of the order. (Name of Arabic origin.)

§ 1. GROSSULÀRIA, Tourn. (GOOSEBERRY.) — *Stems mostly bearing thorns at the base of the leafstalks or clusters of leaves, and often with scattered bristly prickles: berries prickly or smooth.*

* *Peduncles* 1 – 3-*flowered: leaves roundish-heart-shaped,* 3 – 5-*lobed.*

1. **R. Cynósbati,** L. (Wild Gooseberry.) Leaves pubescent; *peduncles slender,* 2 – 3-flowered; *stamens and undivided style not longer than the broad calyx.* — Rocky woods; common, especially northward. May. — Spines strong. Berry large, armed with long prickles like a burr, or rarely smooth.

2. **R. hirtéllum,** Michx. (Smooth Wild Gooseberry.) Leaves somewhat pubescent beneath; *peduncles very short,* 1 – 2-flowered, deflexed; *stamens and* 2-*cleft style scarcely longer than the bell-shaped* (*purplish*) *calyx;* fruit smooth, small, purple, sweet. — Moist grounds, N. England to Wisconsin, common. May. — Stems either smooth or prickly, and with very short thorns, or none. — This yields the commonest smooth gooseberry of New England, &c., and usually passes for R. triflòrum, *Willd.,* which name belongs to the next.

3. **R. rotundifòlium,** Michx. (Smooth Wild Gooseberry.) Leaves nearly smooth; *peduncles slender,* 1 – 3-flowered; *stamens and* 2-*parted style slender, longer than the narrow cylindrical calyx;* fruit smooth, pleasant. — Rocks, W. Massachusetts to Wisconsin, and southward along the mountains to Virginia, &c. June. — Leaves rounded, with very short and blunt lobes.

* * *Racemes* 5 – 9-*flowered, loose, slender, nodding.*

4. **R. lacústre,** Poir. (Swamp Gooseberry.) Young stems clothed with bristly prickles, and with weak thorns; leaves heart-shaped, 3 – 5-parted, with the lobes deeply-cut; calyx broad and flat; stamens and style not longer than the petals; fruit bristly (small, unpleasant). — Cold woods and swamps, N. England to Wisconsin and northward. June.

§ 2. RIBÈSIA, Berl. (Currant.) — *Stems neither prickly nor thorny: flowers* (*greenish*) *in racemes: berries never prickly.*

5. **R. prostràtum,** L'Her. (Fetid Currant.) Stems reclined; leaves deeply heart-shaped, 5 – 7-lobed, smooth; the lobes ovate, acute, doubly serrate; *racemes erect,* slender; calyx flattish; *pedicels and the* (*pale-red*) *fruit glandular-bristly.* — Cold damp woods and rocks, from N. England and Penn. northward. May. — The bruised plant and berries exhale an unpleasant odor.

6. **R. flóridum,** L. (Wild Black Currant.) *Leaves sprinkled with resinous dots,* slightly heart-shaped, sharply 3 – 5-lobed, doubly serrate; *racemes drooping, downy; bracts longer than the pedicels;* calyx tubular-bell-shaped, smooth; *fruit round-ovoid, black, smooth.* — Woods; common. May. — Much like the *Black Currant* of the gardens, which the berries resemble in smell and flavor. Flowers large.

7. **R. rùbrum,** L. (Red Currant.) Stems straggling or reclined; leaves somewhat heart-shaped, obtusely 3 – 5-lobed, serrate, downy beneath when young; *racemes from lateral buds distinct from the leaf-buds, drooping;* calyx flat (green or purplish); *fruit globose, smooth, red.* — Cold damp woods and bogs. New Hampshire to Wisconsin and northward. Same as the *Red Currant* of the gardens. (Eu.)

R. aùreum, Pursh, the Buffalo or Missouri Currant, remarkable for the spicy fragrance of its early yellow blossoms, is cultivated for ornament. Its leaves are convolute (instead of plaited) in the bud.

ORDER 47. PASSIFLORÀCEÆ. (PASSION-FLOWER FAM.)

Vines, climbing by tendrils, with perfect flowers, 5 *monadelphous stamens, and a stalked* 1-*celled ovary free from the calyx, with* 3 *or* 4 *parietal placentæ, and as many club-shaped styles;* — represented by the typical genus

1. PASSIFLÒRA, L. PASSION-FLOWER.

Calyx of 5 sepals united at the base, imbricated in the bud, the throat crowned with a double or triple fringe. Petals 5, arising from the throat of the calyx. Stamens 5: filaments united in a tube which sheathes the long stalk of the ovary, separate above: anthers large, fixed by the middle. Berry (often edible) many-seeded; the anatropous albuminous seeds invested by a pulpy covering. Seed-coat brittle grooved. — Leaves alternate, palmately lobed, generally with stipules. Peduncles axillary, jointed. (Name, from *passio,* passion, and *flos,* a flower, given by the early missionaries in South America to these flowers, in which they fancied a representation of the implements of the crucifixion.)

1. **P. lùtea,** L. Smooth, slender; *leaves obtusely 3-lobed at the summit, the lobes entire;* petioles glandless; flowers greenish-yellow (1′ broad). ♃ — Damp thickets, Ohio, Virginia, and southward. July - Sept. — Fruit ½′ in diameter.

2. **P. incarnàta,** L. Nearly smooth; *leaves 3-cleft; the lobes serrate;* petiole bearing 2 glands; flower large (2′ broad), nearly white, with a triple purple and flesh-colored crown; involucre 3-leaved. — Dry soil, Virginia, Kentucky, and southward. May - July. — Fruit of the size of a hen's egg, oval.

ORDER 48. CUCURBITÀCEÆ. (GOURD FAMILY.)

Herbaceous mostly succulent vines, with tendrils, diœcious or monœcious (often monopetalous) flowers, the calyx-tube cohering with the 1 - 3-*celled ovary, and the* 3 - 5 *stamens commonly more or less united by their often tortuous anthers as well as by the filaments. Fruit* (pepo) *fleshy, or sometimes membranaceous.* — Limb of the calyx and corolla usually more or less combined. Stigmas 2 - 3. Seeds large, usually flat, anatropous, with no albumen. Cotyledons leaf-like. Leaves alternate, palmately lobed or veined. (Mostly tropical or subtropical.)

Synopsis.

1. SICYOS. Corolla of the sterile flowers flat and spreading, 5-lobed. Fruit prickly, indehiscent, 1-celled, 1-seeded.
2. ECHINOCYSTIS. Corolla of the sterile flowers flat and spreading, 6-parted. Pod prickly, 2-celled, 4-seeded, bursting at the top.
3. MELOTHRIA. Corolla of the sterile flowers somewhat campanulate, 5-cleft. Berry smooth, many-seeded.

1. SÍCYOS, L. ONE-SEEDED STAR-CUCUMBER.

Flowers monœcious. Petals 5, united below into a bell-shaped or flattish corolla. Stamens 5, all cohering. Ovary 1-celled, with a single suspended ovule: style slender: stigmas 3. Fruit ovate, dry and indehiscent, filled by the single seed, covered with barbed prickly bristles which are readily detached. — Climbing annuals, with small whitish flowers; the sterile and fertile mostly from the same axils, the former corymbed, the latter in a capitate cluster, long-peduncled. (The Greek name for the Cucumber.)

1. **S. angulàtus,** L. Leaves roundish-heart-shaped and 5-angled or lobed, the lobes pointed; plant beset with clammy hairs. — River-banks. July–Sept.

2. ECHINOCÝSTIS, Torr. & Gray. WILD BALSAM-APPLE.

Flowers monœcious. Petals 6, lanceolate, united at the base into an open spreading corolla. Stamens 3, separable into 2 sets. Ovary 2-celled, with 2 erect ovules in each cell: stigma broad. Fruit large, ovoid, fleshy, at length dry, clothed with weak prickles, bursting at the summit, 2-celled, 4-seeded, the inner part fibrous-netted. Seeds large, obovate-oblong. — An annual, rank, and tall-climbing plant, nearly smooth, with deeply and sharply 5-lobed thin leaves, and very numerous small greenish-white flowers; the sterile in compound racemes often 1° long, the fruitful in small clusters or solitary, from the same axils. (Name composed of ἐχῖνος, *a hedgehog*, and κύστις, *a bladder*, from the prickly covering of the at length bladdery fruit.)

1. **E. lobàta,** Torr. & Gr. (Sicyos, *Michx.* Momórdica echinàta, *Muhl.*) — Rich soil along rivers, W. New England to Wisconsin and Kentucky. July–Oct. — Fruit 2′ long.

3. MELÓTHRIA, L. MELOTHRIA.

Flowers polygamous or monœcious; the sterile campanulate, the corolla 5-lobed; the fertile with the calyx-tube constricted above the ovary, then campanulate. Anthers 3 or 5, more or less united. Berry fleshy, filled with many flat and horizontal seeds. — Tendrils simple. Flowers very small. (Altered from Μήλωθρον, an ancient name for a sort of white grape.)

1. **M. péndula,** L. Slender, climbing; leaves small, roundish and heart-shaped, 5-angled or lobed, roughish; sterile flowers few in small racemes; the fertile solitary, greenish, or yellowish; berry oval (½′–1′ long), green. ♃ — Copses, Virginia and southward. June–Aug.

CÚCUMIS SATÌVUS, the CUCUMBER; C. MÈLO, the MUSKMELON, C. CITRÚLLUS, the WATERMELON; CUCÚRBITA PÈPO, the PUMPKIN, C. MELO-PÈPO, the ROUND SQUASH; C. VERRUCÒSA, the LONG SQUASH; C. AURÁNTIA, the ORANGE GOURD; and LAGENÀRIA VULGÀRIS, the BOTTLE GOURD, are the most familiar cultivated representatives of this family.

ORDER 49. CRASSULÀCEÆ. (ORPINE FAMILY.)

Succulent herbs, with perfectly symmetrical flowers; viz. the petals and pistils equalling the sepals in number (3–20), *and the stamens the same or double their number.* — Sepals persistent, more or less united at the base.

Petals imbricated in the bud (rarely wanting), inserted, with the distinct stamens, on the base of the calyx. Pistils distinct (united below in Penthorum), usually with a little scale at the base of each, forming pods (follicles) which open along the inner suture. Seeds anatropous: the straight embryo surrounded by thin albumen. Flowers usually cymose, small. Leaves chiefly sessile.

Synopsis.

* Pistils entirely separate. (True Crassulaceæ.)

1. TILLÆA. Sepals, petals, stamens, and pistils 3 or 4, distinct.
2. SEDUM. Sepals, petals, and pistils 4 or 5, distinct. Stamens 10 - 8.

* * Pistils united below into a 5-celled many-seeded pod.

3. PENTHORUM. Sepals 5. Petals commonly none. Stamens 10. Pod 5-beaked.

1. TILLÆA, L. TILLÆA.

Sepals, petals, stamens, and pistils 3 or 4. Pods 2 - many-seeded. — Very small tufted annuals, with opposite entire leaves and axillary flowers. (Named in honor of *Tilli*, an early Italian botanist.)

1. **T. símplex,** Nutt. Rooting at the base (1′ - 2′ high); leaves linear-oblong; flowers solitary, nearly sessile; calyx half the length of the (greenish-white) petals and the narrow 8 - 10-seeded pods, the latter with a scale at the base of each. (T. ascéndens, *Eaton*.) — Muddy river-banks, Nantucket to E. Penn. July - Sept.

2. SÈDUM, L. STONE-CROP. ORPINE.

Sepals and petals 4 or 5. Stamens 8 or 10. Pods many-seeded; a little scale at the base of each. — Chiefly perennial, smooth, and thick-leaved herbs, with the flowers cymose or one-sided. (Name from *sedeo*, to sit, alluding to the manner in which these plants fix themselves upon rocks and walls.)

* *Flowers one-sided on the spreading branches of the cyme, forming a sort of spike, mostly with* 4 *petals, &c. and* 8 *stamens, while the central flower commonly has* 5 *petals, &c. and* 10 *stamens.*

1. **S. pulchéllum,** Michx. Stems ascending (4′ - 12′ high); *leaves linear, nearly terete, scattered;* spikes of the cyme several, densely flowered; *petals rose-purple,* lanceolate. — Mountains of Virginia, Kentucky, and southward.

2. **S. ternàtum.** (THREE-LEAVED STONE-CROP.) Stems spreading (3′ - 6′ high); *leaves flat, the lower whorled in threes, wedge-obovate,* the upper scattered, *oblong;* cyme 3-spiked, leafy; *petals white,* linear-lanceolate. Rocky woods, Penn., to Illinois and southward. May, June. Also in gardens.

* * *Flowers in close cymes, uniformly* 10*-androus: leaves flat.*

3. **S. telephioìdes,** Michx. (WILD ORPINE or LIVE-FOR-EVER.) Stems ascending (6′ - 12′ high), stout, leafy to the top; leaves oblong or oval, entire or sparingly toothed, scattered; cyme small; *petals flesh-color,* ovate-lanceolate, taper-pointed; *pods tapering into a slender style.* — Dry rocks, Alleghany Mountains, from Maryland southward, and sparingly in New Jersey? W. New York? and Indiana. June.

4. **S. Telèphium**, L. (GARDEN ORPINE or LIVE-FOR-EVER.) Stems erect (2° high), stout; leaves oval, serrate, obtuse, toothed; cymes compound; *petals purple*, oblong-lanceolate; *pods abruptly pointed with a short style.* — Rocks and banks, escaped from cultivation, and spontaneous in some places. (Adv. from Eu.)

S. ACRE, L., the MOSSY STONE-CROP or WALL-PEPPER, of Europe, — cultivated for edgings, — has become spontaneous in a few places near Boston.

S. RHODÌOLA, a diœcious species, is indigenous in New Brunswick and northward; and therefore may grow in Maine.

8. PENTHÒRUM, Gronov. DITCH STONE-CROP.

Sepals 5. Petals rare, if any. Stamens 10. Pistils 5, united below, forming a 5-angled, 5-horned, and 5-celled pod, which opens by the falling off of the beaks, many-seeded. — Upright weed-like perennials (not fleshy like the rest of the family), with scattered leaves, and yellowish-green flowers loosely spiked along the upper side of the naked branches of the cyme. (Name from πέντε, *five*, and ὅρος, *a rule* or *mode*, probably from the quinary order of the flower.)

1. **P. sedoìdes,** L. Leaves lanceolate, acute at both ends. — Wet places, everywhere. July - Oct. — About 1° high, homely.

SEMPERVIVUM TECTORUM, L., is the cultivated HOUSE-LEEK.

ORDER 50. SAXIFRAGÀCEÆ. (SAXIFRAGE FAMILY.)

Herbs or shrubs, with the pistils mostly fewer than the petals or divisions of the calyx (usually 2, *united below and separate or separating at the top); and the petals with the (mostly* 4 – 10) *stamens inserted on the calyx, which is either free or more or less adherent to the* 1 – 4*-celled ovary.* — Calyx withering-persistent. Petals rarely none. Stamens sometimes indefinitely numerous. Pods several - many-seeded. Seeds small, anatropous, with a slender embryo in fleshy albumen. — A large family, of which we have three of the suborders.

SUBORDER I. SAXIFRAGEÆ. THE TRUE SAXIFRAGE FAMILY.

Herbs; the petals imbricated or rarely convolute in the bud. Calyx free or partly adherent. Stipules none or adherent to the petiole.

* Pod 2-celled, 2-beaked, rarely 3 - 4-celled and beaked, septicidal.

+- Stamens twice as many as the petals or sepals, 10, rarely 8.

1. ASTILBE. Flowers polygamous. Seeds few, and with a loose coat. Leaves decompound
2. SAXIFRAGA. Flowers perfect. Pod or follicles many-seeded Seed-coat close.

+- +- Stamens as many as the petals or sepals, namely 5.

3. BOYKINIA. Calyx-tube top-shaped, coherent with the ovary. Seed-coat close, rough
4. SULLIVANTIA. Calyx bell-shaped, nearly free from the ovary. Seeds wing-margined.

* * Pod one-celled with 2 parietal placentæ.

+- Stamens as many as the lobes of the calyx, namely 5.

5. HEUCHERA. Calyx bell-shaped, coherent with the ovary below. Petals small, entire.

← ← Stamens twice as many as the lobes of the calyx, namely 8 or 10.

6. MITELLA. Calyx partly cohering with the depressed ovary. Petals small, pinnatifid.

7. TIARELLA. Calyx nearly free from the slender ovary. Petals entire.

8. CHRYSOSPLENIUM. Calyx-tube coherent with the ovary. Petals none.

SUBORDER II. ESCALLONIEÆ. THE ESCALLONIA FAMILY.

Shrubs, with alternate simple leaves and no stipules. Petals usually valvate in the bud.

9. ITEA. Calyx free from the 2-celled ovary. Pod many-seeded. Stamens 5.

SUBORDER III. HYDRANGIEÆ. THE HYDRANGEA FAMILY.

Shrubs, with opposite simple leaves and no stipules.

10. HYDRANGEA. Calyx 4-5-toothed, the tube adherent to the imperfectly 2-celled ovary. Petals valvate in the bud. Stamens 8 or 10. Styles 2, diverging.

11. PHILADELPHUS. Calyx 4-5-parted; the tube adhering to the 3-5-celled ovary. Petals convolute in the bud. Stamens 20-40. Styles united below.

SUBORDER I. SAXIFRAGÀCEÆ. TRUE SAXIFRAGE FAMILY.

1. ÁSTÍLBE, Don. FALSE GOATSBEARD.

Flowers diœciously polygamous. Calyx 4-5-parted, small. Petals 4-5, spatulate, small, withering-persistent. Stamens 8 or 10. Ovary 2-celled, almost free, many ovuled: styles 2, short. Pod 2-celled, separating into 2 follicles, each ripening few seeds. Seed-coat loose and thin, tapering at each end.— Perennial herbs, with twice or thrice ternately compound ample leaves, cut-lobed and toothed leaflets, and small white or yellowish flowers in spikes or racemes, which are disposed in a compound panicle. (Name composed of ἀ privative and στίλβη, *a bright surface*, because the foliage is not shining.)

1. **A. decándra,** Don. Somewhat pubescent; leaflets mostly heart-shaped; petals minute or wanting in the fertile flowers; stamens 10.—Rich woods, Alleghanies of S. W. Virginia and southward. July.—Plant imitating Spiræa Aruncus, but coarser, 3°-5° high.

2. SAXÍFRAGA, L. SAXIFRAGE.

Calyx free from, or cohering with, the base of the ovary, 5-cleft or parted. Petals 5, entire, commonly deciduous. Stamens 10. Styles 2. Pod 2-beaked, 2-celled, opening down or between the beaks; or sometimes 2 almost separate follicles. Seeds numerous, with a close coat.—Chiefly perennial herbs, with the root-leaves clustered, those of the stem mostly alternate. (Name from *saxum*, a rock, and *frango*, to break; many species rooting in the clefts of rocks.)

* *Stems prostrate, leafy: leaves opposite: calyx free from the pod.*

1. **S. oppositifòlia,** L. (MOUNTAIN SAXIFRAGE.) Leaves thick and fleshy, ovate, keeled, ciliate, imbricated on the sterile branches (1″-2″ long); flowers solitary, large; petals purple, obovate, much longer than the 5-cleft free calyx.—Rocks, Willoughby Mountain, Vermont (*Wood*), and northward. (Eu.)

* * *Stems ascending, leafy: stem-leaves alternate: calyx coherent below with the pod.*

2. **S. rivulàris,** L. (ALPINE BROOK SAXIFRAGE.) Small; stems weak, 3–5-flowered; lower *leaves rounded,* 3–*5-lobed,* on slender petioles, the upper lanceolate; *petals white, ovate.* — Alpine region of Mount Washington, New Hampshire, *Oakes.* Very rare. (Eu.)

3. **S. aizoìdes,** L. (YELLOW MOUNTAIN SAXIFRAGE.) Low (3'–5' high), in tufts, with few or several corymbose flowers; *leaves linear-lanceolate, entire, fleshy,* more or less ciliate; *petals yellow, spotted with orange, oblong.* — Willoughby Mountain, Vermont; near Oneida Lake, New York; N. Michigan; and northward. June. (Eu.)

4. **S. tricuspidàta,** Retz. Stems tufted (4'–8' high), naked above; flowers corymbose; *leaves oblong or spatulate, with 3 rigid pointed teeth* at the summit; *petals obovate-oblong, yellow.* — Shore of L. Superior and northward. (Eu.)

* * *Leaves clustered at the root: scape many-flowered, erect, clammy-pubescent.*

5. **S. Aizòon,** Jacq. *Leaves persistent, thick, spatulate, with white cartilaginous toothed margins;* calyx partly adherent; petals obovate, cream-color, often spotted at the base. — Moist rocks, Upper Michigan and Wisconsin; Willoughby Mountain (*Mr. Blake*), and northward. — Scape 5'–10' high. (Eu.)

6. **S. Virginiénsis,** Michx. (EARLY SAXIFRAGE.) Low (4'–9' high); *leaves obovate or oval-spatulate,* narrowed into a broad petiole, crenate-toothed, thickish; flowers in a clustered cyme, which is at length open and loosely panicled; lobes of the nearly free *calyx erect, not half the length of the oblong obtuse* (*white*) *petals;* pods 2, united merely at the base, divergent, purplish. — Exposed rocks; common, especially northward. April–June.

7. **S. Pennsylvánica,** L. (SWAMP SAXIFRAGE.) Large (1°–2° high); *leaves oblanceolate, obscurely toothed* (4'–8' long), narrowed at the base into a short and broad petiole; cymes in a large oblong panicle, at first clustered; lobes of the nearly free *calyx recurved, about the length of the linear-lanceolate* (*greenish*) *small petals; filaments awl-shaped:* pods at length divergent. — Bogs, common, especially northward. May, June. — A homely species.

8. **S. eròsa,** Pursh. (LETTUCE SAXIFRAGE.) *Leaves oblong or oblanceolate, obtuse, sharply toothed,* tapering into a margined petiole (8'–12' long); scape slender (1°–3° high); panicle elongated, loosely flowered, pedicels slender; *calyx reflexed, entirely free, nearly as long as the oval obtuse* (*white*) *petals; filaments club-shaped;* pods 2, nearly separate, diverging. — Cold mountain brooks, Pennsylvania (near Bethlehem, *Mr. Wolle*), and throughout the Alleghanies southward. June.

S. LEUCANTHEMIFÒLIA, Michx., S. CAREYÀNA, Gray, and S. CAROLINIÀNA, Gray, of the mountains of Carolina, may occur in those of Virginia.

3. BOYKÍNIA, Nutt. BOYKINIA.

Calyx-tube top-shaped, coherent with the 2-celled and 2-beaked pod. Stamens 5, as many as the deciduous petals. Otherwise as in Saxifraga. — Perennial herbs, with alternate palmately 5–7-lobed or cut petioled leaves, and white flowers in cymes. (Dedicated to the late *Dr. Boykin* of Georgia.)

1. **B. aconitifòlia,** Nutt. Stem glandular (6′–20′ high); leaves deeply 5–7-lobed.—Mountains of S. W. Virginia, and southward. July.

4. SULLIVÁNTIA, Torr. & Gray. SULLIVANTIA.

Calyx bell-shaped, cohering below only with the base of the ovary, 5-cleft. Petals 5, entire, acutish, withering-persistent. Stamens 5, shorter than the petals. Pod 2-celled, 2-beaked, many-seeded, opening between the beaks: the seeds wing-margined, imbricated upwards.—A low and reclined-spreading perennial herb, with rounded and cut-toothed, or slightly lobed, smooth leaves, on slender petioles, and small white flowers in a branched loosely cymose panicle, raised on a nearly leafless slender scape (6′–12′ long). Peduncles and calyx glandular: pedicels recurved in fruit. (Dedicated to the distinguished botanist who discovered the only species.

1. **S. Ohiònis,** Torr. & Gr. (*Gray, Chloris Bor.-Am., pl.* 6.) —Limestone cliffs, Highland County, Ohio. June.

5. HEÙCHERA, L. ALUM-ROOT.

Calyx bell-shaped; the tube cohering at the base with the ovary, 5-cleft. Petals 5, spatulate, small, entire. Stamens 5. Styles 2, slender. Pod 1-celled, with 2 parietal many-seeded placentæ, 2-beaked, opening between the beaks. Seeds oval, with a rough and close seed-coat.—Perennials, with the round heart-shaped leaves principally from the rootstock; those on the scapes, if any, alternate. Petioles with dilated margins or adherent stipules at their base. Flowers in small clusters disposed in a prolonged and narrow panicle, greenish or purplish. (Named in honor of *Heucher*, an early German botanist.)

* *Flowers small, loosely panicled: stamens and styles exserted: calyx regular.*

1. **H. villòsa,** Michx. Scapes (1°–3° high), petioles, and veins of the acutely 7–9-lobed leaves beneath *villous with rusty hairs;* calyx 1½″ long; *petals spatulate-linear, about as long as the stamens,* soon twisted.—Rocks, Maryland, Kentucky, and southward, in and near the mountains. July, Aug.

2. **H. Americàna,** L. (COMMON ALUM-ROOT.) Scapes (2°–3° high) &c. *glandular* and more or less *hirsute with short hairs;* leaves roundish, with short rounded lobes and crenate teeth; calyx broad, 2″ long, the *spatulate petals not longer than its lobes.*—Rocky woodlands, Connecticut to Wisconsin and southward. June.

* * *Flowers larger: calyx (3″–4″ long) more or less oblique: stamens short: panicle very narrow: leaves rounded, slightly 5–9-lobed.*

3. **H. hispida,** Pursh. *Hispid or hirsute* with long spreading hairs (occasionally almost glabrous), scarcely glandular; *stamens soon exserted, longer than the spatulate petals.* (H. Richardsonii, *R. Br.*)—Mountains of Virginia. Also Illinois (*Dr. Mead*) and northwestward. May–July.—Scapes 2°–4° high.

4. **H. pubéscens,** Pursh. Scape (1°–3° high), &c. *granular-pubescent or glandular above,* not hairy, below often glabrous, as are usually the rounded leaves; *stamens shorter than the lobes of the calyx* and the spatulate petals.—Mountains of Penn. to Virginia and Kentucky. June, July.

6. MITÉLLA, Tourn. MITRE-WORT. BISHOP'S-CAP.

Calyx short, coherent with the base of the ovary, 5-cleft. Petals 5, slender, pinnatifid. Stamens 10, included. Styles 2, very short. Pod short, 2-beaked, 1-celled, with 2 parietal or rather basal several-seeded placentæ, 2-valved at the summit. Seeds smooth and shining. — Low and slender perennials, with round heart-shaped alternate leaves on the rootstock or runners, on slender petioles; those on the scapes opposite, if any. Flowers small, in a simple slender raceme or spike. (Name a diminutive from *μίτρα*, *a mitre*, or *cap*, alluding to the form of the young pod.)

1. **M. diphýlla,** L. *Hairy, leaves heart-shaped, acute,* somewhat 3–5-lobed, toothed, *those on the many-flowered-scape* 2, *opposite, nearly sessile.* — Hillsides in rich woods, W. N. England to Wisconsin and Kentucky. May. — Flowers white, in a raceme 6′–8′ long.

2. **M. nùda,** L. Small and slender; *leaves rounded or kidney-form,* deeply and doubly crenate; *scape usually leafless, few-flowered,* very slender (4′–6′ high). (M. cordifolia, *Lam.* M. prostrata, *Michx.*) — Deep moist woods with mosses, Maine to Wisconsin and northward. May–July. — A delicate little plant, shooting forth runners in summer. Blossoms greenish.

7. TIARÉLLA, L. FALSE MITRE-WORT.

Calyx bell-shaped, nearly free from the ovary, 5-parted. Petals 5, with claws, entire. Stamens 10, long and slender. Styles 2. Pod membranaceous, 1 celled, 2-valved, the valves unequal. Seeds few, at the base of each parietal placenta, globular, smooth. — Perennials: flowers white. (Name a diminutive from *τιάρα*, *a tiara*, or turban, from the form of the pod, or rather pistil, which is like that of Mitella, to which the name of *Mitre-wort* properly belongs.)

1. **T. cordifòlia,** L. Leaves from the rootstock or summer runners heart-shaped, sharply lobed and toothed, sparsely hairy above, downy beneath; scape leafless (5′–12′ high); raceme simple; petals oblong. — Rich rocky woods; common from Maine to Wisconsin, northward, and southward along the mountains. April, May.

8. CHRYSOSPLÈNIUM, Tourn. GOLDEN SAXIFRAGE.

Calyx-tube coherent with the ovary; the blunt lobes 4–5, yellow within. Petals none. Stamens 8–10, very short, inserted on a conspicuous disk. Styles 2. Pod inversely heart-shaped or 2-lobed, flattened, very short, 1-celled, with 2 parietal placentæ, 2-valved at the top, many-seeded. — Low and small smooth herbs, with tender succulent leaves, and small solitary or leafy-cymed flowers. (Name compounded of *χρυσός*, *golden*, and *σπλήν*, *the spleen*, probably from some reputed medicinal qualities.)

1. **C. Americànum,** Schwein. Stems slender, diffusely spreading, forking; leaves principally opposite, roundish or somewhat heart-shaped, obscurely crenate-lobed; flowers distant, inconspicuous, nearly sessile (greenish tinged with yellow or purple). ♃ — Cold wet places; common, especially northward. April, May.

SUBORDER II. ESCALLONIÈÆ. THE ESCALLONIA FAMILY

9. ÍTEA, L. ITEA.

Calyx 5-cleft, free from the ovary. Petals 5, lanceolate, much longer than the calyx, and longer than the 5 stamens. Pod oblong, 2-grooved, 2-celled, tipped with the 2 united styles, 2-parted (septicidal) when mature, several-seeded. — A shrub, with simple alternate and minutely serrate oblong pointed leaves, without stipules, and white flowers in simple dense racemes. (The Greek name of the Willow.)

1. **I. Virgínica,** L. — Wet places, New Jersey and southward, near the coast. June. — Shrub 3° - 8° high.

SUBORDER III. HYDRANGIÈÆ. THE HYDRANGEA FAMILY.

10. HYDRÁNGEA, Gronov. HYDRANGEA.

Calyx-tube hemispherical, 8 - 10-ribbed, coherent with the ovary; the limb 4 - 5-toothed. Petals ovate, valvate in the bud. Stamens 8 - 10, slender. Pod crowned with the 2 diverging styles, 2-celled below, many-seeded, opening by a hole between the styles. — Shrubs, with opposite petioled leaves, no stipules, and numerous flowers in compound cymes. The marginal flowers are usually sterile and radiant, consisting merely of a membranaceous and colored flat and dilated calyx, and showy. (Name from ὕδωρ, *water*, and ἄγγος, *a vase.*)

1. **H. arboréscens,** L. (WILD HYDRANGEA.) Glabrous or nearly so; leaves ovate, rarely heart-shaped, pointed, serrate, green both sides; cymes flat. — Rocky banks, N. Penn., Ohio, and southward, chiefly along the mountains. July. — Flowers often all fertile, rarely all radiant, like the *Garden Hydrangea.*

11. PHILADÉLPHUS, L. MOCK ORANGE OR SYRINGA.

Calyx-tube top-shaped, coherent with the ovary; the limb 4 - 5-parted, spreading, persistent, valvate in the bud. Petals rounded or obovate, large, convolute in the bud. Stamens 20 - 40. Styles 3 - 5, united below or nearly to the top. Stigmas oblong or linear. Pod 3 - 5-celled, splitting at length into as many pieces. Seeds very numerous, on thick placentæ projecting from the axis, pendulous, with a loose membranaceous coat prolonged at both ends. — Shrubs, with opposite often toothed leaves, no stipules, and solitary or cymose-clustered showy white flowers. (An ancient name applied by Linnæus to this genus for no particular reason.)

1. **P. inodòrus,** L. Glabrous; leaves ovate or ovate-oblong, pointed, entire or with some spreading teeth; flowers single or few at the ends of the diverging branches, scentless; calyx-lobes acute, scarcely longer than the tube. — Mountains of Virginia and southward.

Var. **grandiflòrus.** Somewhat pubescent; flowers larger; calyx-lobes longer and taper-pointed. — Virginia and southward, near the mountains.

May-July. — A tall shrub, with recurved branches: often cultivated. Leaves tasting like cucumbers.

P. CORONÀRIUS, L., the common MOCK ORANGE or SYRINGA of the gardens, has cream-colored, odorous flowers in full clusters.

ORDER 51. HAMAMELÀCEÆ. (WITCH-HAZEL FAMILY.)

Shrubs or trees, with alternate simple leaves and deciduous stipules; flowers in heads or spikes, often polygamous or monœcious; the calyx cohering with the base of the ovary; which consists of 2 pistils united below, and forms a 2-beaked 2-celled woody pod opening at the summit, with a single bony seed in each cell, or several, only one or two of them ripening. — Petals inserted on the calyx, narrow, valvate or involute in the bud, or often none at all. Stamens twice as many as the petals, and half of them sterile and changed into scales, or numerous. Seeds anatropous. Embryo large and straight, in sparing albumen: cotyledons broad and flat. — We have a single representative of the 3 tribes, two of them apetalous.

Synopsis.

TRIBE I. HAMAMELEÆ. Flowers with a manifest calyx and corolla, and a single ovule suspended from the summit of each cell.

1 HAMAMELIS. Petals 4, strap-shaped. Stamens and scales each 4, short.

TRIBE II. FOTHERGILLEÆ. Flowers with a manifest calyx and no corolla. Fruit and seed as in Tribe I.

2. FOTHERGILLA. Stamens about 24, long: filaments thickened upwards. Flowers spiked.

TRIBE III. BALSAMIFLUÆ. Flowers naked, with barely rudiments of a calyx, and no corolla, crowded in catkin-like heads. Ovules several or many in each cell.

3. LIQUIDAMBAR. Monœcious or polygamous. Stamens very numerous. Pods consolidated by their bases in a dense head.

1. HAMAMÈLIS, L. WITCH-HAZEL.

Flowers in little axillary clusters or heads, usually surrounded by a scale-like 3-leaved involucre. Calyx 4-parted, and with 2 or 3 bractlets at its base. Petals 4, strap-shaped, long and narrow, spirally involute in the bud. Stamens 8, very short; the 4 alternate with the petals anther-bearing, the others imperfect and scale-like. Styles 2, short. Pod opening loculicidally from the top; the outer coat separating from the inner, which encloses the single large and bony seed in each cell, but soon bursts elastically into two pieces. — Tall shrubs, with straight-veined leaves, and yellow, perfect or polygamous flowers. (From ἅμα, *like to*, and μηλίς, *an apple-tree;* a name anciently applied to the Medlar, or some other tree resembling the Apple, which the Witch-Hazel does not.)

1. **H. Virginica,** L. Leaves obovate or oval, wavy-toothed, somewhat downy when young. — Damp woods: blossoming late in autumn, when the leaves are falling, and maturing its seeds the next summer.

2. FOTHERGÍLLA, L. f. FOTHERGILLA.

Flowers in a terminal catkin-like spike, mostly perfect. Calyx bell-shaped, the summit truncate, slightly 5–7-toothed. Petals none. Stamens about 24, borne on the margin of the calyx in one row, all alike: filaments very long, thickened at the top (white). Styles 2, slender. Pod cohering with the base of the calyx, 2-lobed, 2-celled, with a single bony seed in each cell. — A low shrub; the oval or obovate leaves smooth, or hoary underneath, toothed at the summit; the flowers appearing rather before the leaves, each partly covered by a scale-like bract. (Dedicated to the distinguished *Dr. Fothergill.*)

1. **F. alnifòlia,** L. f. — Low grounds, Virginia and southward. April.

3. LIQUIDÁMBAR, L. SWEET-GUM TREE.

Flowers usually monœcious, in globular heads or catkins; the sterile arranged in a conical cluster, naked: stamens very numerous, intermixed with minute scales: filaments short. Fertile flowers consisting of many 2-celled 2-beaked ovaries, subtended by minute scales in place of a calyx, all more or less cohering and hardening in fruit, forming a spherical catkin or head; the pods opening between the 2 awl-shaped beaks. Styles 2, stigmatic down the inner side. Ovules many, but only one or two perfecting. Seeds with a wing-angled seed-coat. — Catkins racemed, nodding, in the bud enclosed by a 4-leaved deciduous involucre. (A mongrel name, from *liquidus*, fluid, and the Arabic *ambar*, amber; in allusion to the fragrant terebinthine juice which exudes from the tree.)

1. **L. Styracíflua,** L. (SWEET GUM. BILSTED.) Leaves rounded, deeply 5–7-lobed, smooth and shining, glandular-serrate, the lobes pointed. — Moist woods, Connecticut to Virginia, and southward. April. — A large and beautiful tree, with fine-grained wood, the gray bark with corky ridges on the branchlets. Leaves fragrant when bruised, turning deep crimson in autumn. The woody pods filled mostly with abortive seeds, resembling sawdust.

ORDER 52. UMBELLÍFERÆ. (PARSLEY FAMILY.)

Herbs, with the flowers in umbels, the calyx entirely adhering to the ovary, the 5 petals and 5 stamens inserted on the disk that crowns the ovary and surrounds the base of the 2 styles. Fruit consisting of 2 seed-like dry carpels. Limb of the calyx obsolete, or a mere 5-toothed border. Petals mostly with the point inflexed. Fruit of 2 carpels (called *mericarps*) cohering by their inner face (the *commissure*), when ripe separating from each other and usually suspended from the summit of a slender prolongation of the axis (*carpophore*): each carpel marked lengthwise with 5 *primary ribs*, and often with 5 intermediate (*secondary*) ones; in the *interstices* or *intervals* between them are commonly lodged the oil-tubes (*vittæ*), which are longitudinal canals in the substance of the fruit, containing aromatic oil. (These are best seen in slices made across the fruit.) Seeds solitary and suspended from the summit of each cell, anatropous, with a minute embryo in hard, horn-like albumen. — Stems usually hollow. Leaves alternate, mostly compound, the petioles expanded or sheathing at the base. Umbels usually compound; when the secondary ones are termed *umbellets:* each often subtended by a whorl of bracts (*involucre* and *involucels*). — A large family, some of the plants innocent and aromatic, others with very poisonous (acrid-narcotic) properties; the flowers much alike in all, — therefore to be studied by their fruits, inflorescence, &c., which likewise exhibit comparatively small diversity. The family is therefore a difficult one for the young student.

Synopsis.

I. Inner face of each seed flat or nearly so (not hollowed out).

* Umbels simple or imperfect, sometimes one growing from the summit of another

1. **HYDROCOTYLE.** Fruit orbicular, flat. Leaves orbicular or rounded.
2. **CRANTZIA.** Fruit globular. Leaves thread-shaped, fleshy and hollow.

* * Umbels or umbellets capitate, imperfect: i. e. the flowers sessile in heads.

3. **SANICULA.** Fruit clothed with hooked prickles. Flowers polygamous.
4. **ERYNGIUM.** Fruit clothed with scales. Flowers in thick heads, perfect.

* * * Umbels compound and perfect; i. e. its rays bearing umbellets.

+- Fruit beset with bristly prickles, not flat.

5. **DAUCUS.** Fruit beset with weak prickles in single rows on the ribs.

+- +- Fruit smooth, strongly flattened on the back, and single-winged or margined at the junction of the 2 carpels (next to the commissure).

6. **POLYTÆNIA.** Fruit surrounded with a broad and tumid corky margin thicker than the fruit itself, which is nearly ribless on the back.
7. **HERACLEUM.** Fruit broadly wing-margined: the carpels minutely 5-ribbed on the back: lateral ribs close to the margin. Flowers white, the marginal ones radiant.
8. **PASTINACA.** Fruit wing-margined: ribs of the carpels as in No. 7. Flowers yellow, the marginal ones perfect, not radiant.
9. **ARCHEMORA.** Fruit broadly winged: the 5 ribs on the back equidistant; the 2 lateral ones close to the wing. Flowers white. Leaves pinnate or 3-foliolate.
10. **TIEDEMANNIA.** Fruit winged, much as in No. 9. Leaves simple, long and cylindrical, hollow, with some cross partitions.

+- +- +- Fruit smooth, flat or flattish on the back, and double-winged or margined at the edge, each carpel also 3-ribbed or sometimes 3-winged on the back.

11. **ANGELICA.** Carpels with 3 slender ribs on the back; a single oil-tube in each interval. Seed not loose.
12. **ARCHANGELICA.** Carpels with 3 rather stout ribs on the back, and 2-3 or more oil-tubes in each interval, adhering to the loose seed.
13. **CONIOSELINUM.** Carpels with 3 wings on the back narrower than those of the margins.

+- +- +- +- Fruit smooth, not flattened either way, or slightly so, the cross-section nearly orbicular or quadrate; the carpels each with 5 wings or strong ribs.

14. **ÆTHUSA.** Fruit ovate-globose: carpels with 5 sharply keeled ridges, and with single oil tubes in the intervals.
15. **LIGUSTICUM.** Fruit elliptical: carpels with 5 sharp almost winged ridges, and with several oil-tubes in each interval.
16. **THASPIUM.** Fruit elliptical or ovoid: carpels 5-winged or 5-ribbed, and with single oil-tubes in each interval. Flowers yellow or dark purple.

+- +- +- +- +- Fruit smooth, flattened laterally or contracted at the sides, wingless.

17. **ZIZIA.** Flowers yellow. Fruit oval, somewhat twin: the carpels narrowly 5-ribbed: oil-tubes 3 in each interval. Leaves compound.

18. BUPLEURUM. Flowers yellow. Fruit ovoid-oblong: the carpels somewhat 5-ribbed. Leaves all simple.
19. DISCOPLEURA. Flowers white. Fruit ovoid: the lateral ribs united with a thick corky margin. Leaves cut into capillary divisions.
20. CICUTA. Flowers white. Fruit subglobose, twin: the carpels strongly and equally 5-ribbed. Leaves twice or thrice ternate.
21. SIUM. Flowers white. Fruit ovate-globose: the carpels 5-ribbed. Leaves all simply pinnate.
22. CRYPTOTÆNIA. Flowers white. Fruit oblong. Leaves 3-parted. Umbel irregular.

II. Inner face of the seed hollowed out lengthwise, or the margins involute, so that the cross-section is semilunar. (Umbels compound.)

23. CHÆROPHYLLUM. Fruit linear-oblong, narrowed at the apex: ribs broad.
24. OSMORRHIZA. Fruit linear-club-shaped, tapering below: ribs bristly.
25. CONIUM. Fruit ovate, flattened at the sides: ribs prominent, wavy.
26. EULOPHUS. Fruit ovoid, somewhat twin, nearly destitute of ribs.

III. Inner face of the seed hollowed in the middle, or curved inwards at the top and bottom, so that the section lengthwise is semilunar.

27. ERIGENIA. Fruit twin; carpels nearly kidney-form. Umbellets few-flowered.

1. HYDROCÓTYLE, Tourn. MARSH PENNYWORT.

Calyx-teeth obsolete. Fruit flattened laterally, orbicular or shield-shaped; the carpels 5-ribbed, two of the ribs enlarged and often forming a thickened margin: oil-tubes none. — Low and smooth marsh perennials, with slender stems creeping or rooting in the mud, and round shield-shaped or kidney-form leaves. Flowers small, white, in simple umbels or clusters, which are either single or proliferous, appearing all summer. (Name from ὕδωρ, *water*, and κοτύλη, *a flat cup*, the peltate leaves of several species being somewhat cup-shaped.)

* *Stems procumbent and branching: flowers* 3 – 5 *in a sessile cluster.*

1. **H. Americàna,** L. Leaves rounded kidney-form, doubly crenate, somewhat lobed, short-petioled; fruit orbicular. — Shady springy places; common northward.

* * *Umbels on scape-like naked peduncles, arising, with the long-petioled leaves, from the joints of creeping and rooting stems.*

2. **H. ranunculoìdes,** L. *Leaves round-reniform*, 3 – 5-*cleft*, the lobes crenate; peduncles much shorter than the petioles; umbel 5 – 10-flowered; pedicels very short; *fruit orbicular, scarcely ribbed.* — Penn. and southward.

3. **H. interrúpta,** Muhl. *Leaves peltate* in the middle, orbicular crenate; peduncles about the length of the leaves, bearing *clusters of few and sessile flowers interruptedly* along its length; fruit broader than long, notched at the base. — New Bedford, Massachusetts, and southward along the coast.

4. **H. umbellàta,** L. *Leaves peltate* in the middle, orbicular, notched at the base, doubly crenate; peduncle elongated (3′ - 9′ high), bearing a *many-flowered umbel* (sometimes proliferous with 2 or 3 umbels); pedicels slender, fruit notched at the base and apex. Massachusetts and southward near the coast.

2. CRÁNTZIA, Nutt. CRANTZIA.

Calyx-teeth obsolete. Fruit globose; the carpels corky, 5-ribbed: an oil-tube in each interval. — Minute plants, creeping and rooting in the mud, like Hydrocotyle, but with fleshy and hollow cylindrical or awl-shaped petioles, in place of leaves, marked with cross divisions. Umbels few-flowered, simple. Flowers white. (Named for *Prof. Crantz*, an Austrian botanist of the 18th century.)

1. **C. lineàta,** Nutt. (Hydrocotyle lineata, *Michx.*) Leaves somewhat club-shaped, very obtuse (1′–2′ long); lateral ribs of the fruit projecting, forming a corky margin. ♃ — Brackish marshes, from Massachusetts southward along the coast. July.

3. SANÍCULA, Tourn. SANICLE. BLACK SNAKEROOT.

Calyx-teeth manifest, persistent. Fruit globular; the carpels not separating spontaneously, ribless, thickly clothed with hooked prickles, each with 5 oil-tubes. — Perennial herbs, with palmately-lobed or parted leaves, those from the root long-petioled. Umbels irregular or compound, the flowers (greenish or yellowish) capitate in the umbellets, perfect, and with staminate ones intermixed. Involucre and involucels few-leaved. (Name from *sano*, to heal.)

1. **S. Canadénsis,** L. Leaves 3–5- (the upper only 3-) parted; *sterile flowers few, scarcely pedicelled,* shorter than the fertile ones; *styles shorter than the prickles of the fruit.* — Copses. June–Aug. — Plant 1°–2° high, with thin leaves; their divisions wedge-obovate or oblong, sharply cut and serrate, the lateral mostly 2-lobed. Fruits few in each umbellet.

2. **S. Marilándica,** L. Leaves all 5–7-parted; *sterile flowers numerous, on slender pedicels,* about the length of the fertile; *styles elongated and conspicuous, recurved.* — Woods and copses, common. — Stem 2°–3° high; the leaves more rigid and with narrower divisions than in the former, with almost cartilaginous teeth. Fruits several in each umbellet.

4. ERÝNGIUM, Tourn. BUTTON SNAKEROOT.

Calyx-teeth manifest, persistent. Styles slender. Fruit top-shaped, covered with little scales or tubercles, with no ribs, and scarcely any oil-tubes. — Chiefly perennials, with coriaceous, toothed, cut, or prickly leaves, and blue or white bracted flowers closely sessile in dense heads. (A name used by Dioscorides, of uncertain origin.)

1. **E. yuccæfòlium,** Michx. (RATTLESNAKE-MASTER. BUTTON SNAKEROOT.) *Leaves* linear, taper-pointed, rigid, *grass-like, nerved, bristly-fringed;* leaflets of the involucre mostly entire and shorter than the heads. ♃ (E. aquaticum, *L.* in part; but it never grows in water.) — Dry or damp pine-barrens or prairies, New Jersey to Wisconsin, and southward. July.

2. **E. Virginiànum,** Lam. *Leaves* linear-lanceolate, *serrate with hooked or somewhat spiny teeth,* veiny; leaflets of the involucre cleft or spiny-toothed, longer than the cymose whitish or bluish heads. ② — Swamps, New Jersey and southward near the coast. July.

5. DAÙCUS, Tourn. CARROT.

Calyx 5-toothed. Corolla irregular. Fruit ovoid or oblong; the carpels scarcely flattened on the back, with 5 primary slender bristly ribs, two of them on the inner face, also with 4 equal and more or less winged secondary ones, each bearing a single row of slender bristly prickles: an oil-tube under each of these ribs. — Biennials, with finely 2-3-pinnate or pinnatifid leaves, cleft involucres, and concave umbels, dense in fruit. (The ancient Greek name.)

1. **D.** CARÒTA, L. (COMMON CARROT.) Stem bristly; involucre pinnatifid, nearly the length of the umbel. — Spontaneous in old fields in certain places. July - Sept. — Flowers white or cream-color, the central one of each umbellet abortive and dark purple. Umbel in fruit dense and concave, resembling a bird's nest. (Adv. from Eu.)

6. POLYTÆ̀NIA, DC. POLYTÆNIA.

Calyx 5-toothed. Fruit oval, very flat, with an entire broad and thick corky margin, the impressed back very obscurely ribbed: oil-tubes 2 in each interval, and many in the corky margin. — A smooth herb, resembling a Parsnip, with twice-pinnate leaves, the uppermost opposite and 3-cleft, no involucres, bristly involucels, and bright yellow flowers. (Name from πολύς, *many*, and ταινία, *a fillet*, alluding to the numerous oil-tubes.)

1. **P. Nuttállii,** DC. — Barrens, Michigan, Wisconsin, and southwestward. May. — Stem 2° - 3° high.

7. HERACLÈUM, L. COW-PARSNIP.

Calyx-teeth minute. Fruit as in Pastinaca, but the oil-tubes shorter than the carpels (reaching from the summit to the middle). Petals (white) inversely heart-shaped, those of the outer flowers commonly larger and radiant, appearing 2-cleft. — Stout perennials, with broad sheathing petioles and large flat umbels. Involucre deciduous: involucels many-leaved. (Dedicated to *Hercules*.)

1. **H. lanàtum,** Michx. Woolly; stem grooved; leaves 1-2-ternately compound; leaflets somewhat heart-shaped; fruit obovate or orbicular. — Moist rich ground; most common northward. June. — A very large, strong-scented plant, 4° - 8° high, in some places wrongly called *Masterwort*.

8. PASTINÀCA, Tourn. PARSNIP.

Calyx-teeth obsolete. Fruit oval, flat, with a thin single-winged margin; the carpels minutely 5-ribbed; three of the ribs equidistant on the back, the lateral ones distant from them and contiguous to the margin: an oil-tube in each interval running the whole length of the fruit. Petals yellow, roundish, entire; none of the flowers radiant. — Chiefly biennials, with spindle-shaped roots, and pinnately-compound leaves. Involucre and involucels small or none. (The Latin name, from *pastus*, food.)

1. **P.** SATÌVA, L. (COMMON PARSNIP.) Stem grooved, smooth; leaflets ovate or oblong, obtuse, cut-toothed, somewhat shining above. — Fields, &c. July. (Adv. from Eu.)

9. ARCHÉMORA, DC. COWBANE.

Calyx 5-toothed. Fruit with a broad single-winged margin, oval, flattish the carpels with 5 obtuse and approximated equidistant ribs on the convex back: oil-tubes one in each interval, and 4 – 6 on the inner face. — Smooth perennials, with rather rigid leaves of 3 – 9 lanceolate or linear leaflets. Involucre nearly none: involucels of numerous small leaflets. Flowers white. (Name applied to this poisonous umbelliferous plant in fanciful allusion to *Archemorus*, who is said to have died from eating parsley. *DC.*)

1. **A. rigida,** DC. Leaves simply pinnate; leaflets 3 – 9, varying from lanceolate to ovate-oblong, entire or remotely toothed, or, in Var. AMBÍGUA, linear, long and narrow. — Sandy swamps, N. Jersey and W. New York to Michigan, Illinois, and southward. Aug. — Stem 2° – 5° high.

10. TIEDEMÁNNIA, DC. FALSE WATER-DROPWORT.

Calyx 5-toothed. Fruit with a single winged margin, obovate, flattish; the carpels with 5 equidistant slender ribs on the convex back: oil-tubes one in each interval, and 2 on the inner face. — A smooth and erect aquatic herb, with a hollow stem (2° – 6° high), and cylindrical pointed and hollow petioles (the cavity divided by cross partitions) in place of leaves. Involucre and involucels of few subulate leaflets. Flowers white. (Dedicated to the anatomist, *Prof. Tiedemann*, of Heidelberg.)

1. **T. teretifòlia,** DC. — Virginia (Harper's Ferry) and southward. Aug.

11. ANGÉLICA, L. ANGELICA.

Calyx-teeth obsolete. Fruit flattened, with a double-winged margin at the commissure; i. e. the lateral rib of each oval carpel expanded into a wing, their flattish backs each strongly 3-ribbed: an oil-tube in each interval, and 2 – 4 on the inner face. Seed adherent to the pericarp. — Stout herbs, more or less aromatic, with first ternately, then once or twice pinnately or ternately divided leaves, toothed and cut ovate or oblong leaflets, large terminal umbels, scanty or no involucre, and small many-leaved involucels. Flowers white or greenish. Petioles membranaceous at the base. (Named *angelic*, from its cordial and medicinal properties.)

1. **A. Curtísii,** Buckley. Nearly glabrous; leaves twice ternate or the divisions quinate; leaflets thin, ovate or ovate-lanceolate, pointed, sharply cut and toothed; involucels of small subulate leaflets; wings of the fruit broad. ♃ — Cheat Mountain, Virginia, and southward in the Alleghanies. Aug.

12. ARCHANGÉLICA, Hoffm. ARCHANGELICA.

Calyx-teeth short. Seed becoming loose in the pericarp, coated with numerous oil-tubes which adhere to its surface. Otherwise as in Angelica, from which the species have been separated.

1. **A. hirsuta,** Torr. & Gr. *Woolly or downy* at the top (2° – 5° high), *rather slender;* leaves twice pinnately or ternately divided; leaflets thickish.

ovate-oblong, often blunt, serrate; involucels as long as the umbellets; peduncles and *fruit downy, broadly winged.* ♃ (Angélica triquinàta, *Nutt.*) — Dry open woods, New York to Michigan, and southward. July. — Flowers white.

2. **A. atropurpùrea,** Hoffm. (GREAT ANGELICA.) *Smooth;* stem dark purple, *very stout* (4° – 6° high), hollow; leaves 2 – 3-ternately compound; the leaflets pinnate, 5 – 7, sharply cut serrate, acute, pale beneath; petioles much inflated; involucels very short; *fruit smooth, winged.* ♃ (Angélica triquinàta, *Michx.*) — Low river-banks, N. England to Penn., Wisconsin, and northward. June. — Flowers greenish-white. Plant strong-scented; a popular aromatic.

3. **A. peregrìna,** Nutt. Stem a little downy at the summit (1° – 3° high); leaves 2 – 3-ternately divided, the leaflets ovate, acute, cut-serrate, glabrous; involucels about as long as the umbellets; *fruit* oblong with 5 *thick and corky wing-like ribs* to each carpel, the *marginal ones little broader than the others.* ♃ — Rocky coast of Massachusetts Bay and northward. July. — Flowers greenish-white. Plant little aromatic. Fruit so thick and so equally ribbed, rather than winged, that it might be taken for a Ligusticum. Perhaps it is the Angelica lucida, *L.*

13. CONIOSELÌNUM, Fischer. HEMLOCK PARSLEY.

Calyx-teeth obsolete. Fruit oval; the carpels convex-flattish and narrowly 3-winged on the back, and each more broadly winged at the margins: oil-tubes in the substance of the pericarp, 1 – 3 in each of the intervals, and several on the inner face. — Smooth herbs, with finely 2 – 3-pinnately compound thin leaves, inflated petioles, and white flowers. Involucre scarcely any: leaflets of the involucels awl-shaped. (Name compounded of *Conium*, the Hemlock, and *Selinum*, Milk-Parsley, from its resemblance to these two genera.)

1. **C. Canadénse,** Torr. & Gr. Leaflets pinnatifid; fruit longer than the pedicels. ♃ — Swamps, Vermont to Wisconsin northward, and southward in the Alleghanies. Aug. — Herbage resembling the Poison Hemlock.

14. ÆTHÙSA, L. FOOL'S PARSLEY.

Calyx-teeth obsolete. Fruit ovate-globose; the carpels each with 5 thick sharply-keeled ridges: intervals with single oil-tubes. — Annual, poisonous herbs, with 2 – 3-ternately compound and many-cleft leaves, the divisions pinnate, and white flowers. (Name from αἴθω, *to burn*, from the acrid taste.)

1. **Æ.** CYNÀPIUM, L. Divisions of the leaves wedge-lanceolate; involucre none; involucels 3-leaved, long and narrow. — About cultivated grounds, New England, &c. July. — A fetid, poisonous herb, with much the aspect of Poison Hemlock, but with dark-green foliage, long hanging involucels, and unspotted stem. (Adv. from Eu.)

15. LIGÚSTICUM, L. LOVAGE.

Calyx-teeth small or minute. Fruit elliptical, round on the cross-section, or slightly flattened on the sides; the carpels each with 5 sharp and projecting or narrowly winged ridges: intervals and inner face with many oil-tubes. — Perennials, with aromatic roots and fruit, 2 – 3-ternately compound leaves, and white flowers. (Named from the country *Liguria*, where the officinal *Lovage* of the gardens, *L. Levisticum*, abounds.)

1. **L. Scóticum,** L. (Scotch Lovage.) Very smooth; stem (2° high) nearly simple; *leaves 2-ternate;* leaflets rhombic-ovate, coarsely toothed or cut; leaflets of the involucre and involucels linear; calyx-teeth distinct; *fruit narrowly oblong.* — Salt marshes, from Rhode Island northward. Aug. — Root acrid but aromatic. (Eu.)

2. **L. actæifòlium,** Michx. (Nondo. Angelico.) Smooth; stem (3° – 6° high) branched above; the numerous umbels forming a loose and naked somewhat *whorled panicle*, the lateral ones mostly barren; *leaves 3-ternate;* leaflets broadly ovate, equally serrate, the end ones often 3-parted; calyx-teeth minute; ribs of the *short fruit* wing-like. — Rich woods, Virginia, Kentucky, and southward along the mountains. July, Aug. — Root large, with the strong aromatic odor and taste of Angelica. (Michaux's habitat, "Banks of the St. Lawrence," is probably a mistake.)

16. THÁSPIUM, Nutt. Meadow-Parsnip.

Calyx-teeth obsolete or short. Fruit ovoid or oblong, somewhat flattish or contracted at the sides (the cross-section of each seed orbicular and somewhat angled or 5-angular); the carpels each with 5 strong and equal ribs or wings, the lateral ones marginal: oil-tubes single in each interval. — Perennial herbs, with 1 – 2-ternately divided leaves (or the root-leaves simple), umbels with no involucre, minute few-leaved involucels, and yellow or sometimes dark-purple flowers. (Name a play upon *Thapsia*, a genus so called from the island of Thapsus.) — I include in this genus Zizia, *Koch*, — because what is apparently the same species has the fruit either ribbed or winged, — and retain the name of Zizia for Z. integerrima, *DC.*

* *Stems loosely branched, 2° – 5° high, mostly pubescent on the joints: calyx short but manifest: corolla light yellow: leaves all ternately compound.*

1. **T. barbinòde,** Nutt. Leaves 1 – 3-ternate; *leaflets ovate or lance-ovate and acute, mostly with a wedge-shaped base,* above deeply cut-serrate, often 2 – 3-cleft or parted, the terminal one long-stalked (1′ – 2′ long); *fruit oblong, 6 – 10-winged* (3″ long), some of the dorsal wings often narrow or obsolete. — River-banks, W. New York to Wisconsin, and southward. July.

2. **T. pinnatífidum.** Branchlets, umbels, &c. *roughish-puberulent;* leaves 1 – 3-ternate; *leaflets 1 – 2-pinnatifid, the lobes linear or oblong; fruit oblong, narrowly 8 – 10-winged* (1½′ long), the intervals minutely scabrous. (Zizia pinnatifida, *Buckley*. Thaspium Walteri, *Shuttlew.*, excl. syn. *Walt.*) — Barrens of Kentucky (*Short*), and southward in the mountains.

* * *Stems somewhat branched; the whole plant glabrous: calyx-teeth obscure.*

3. **T. aùreum,** Nutt. *Leaves all 1 – 2-ternately divided or parted* (or rarely some of the root-leaves simple and heart-shaped); the divisions or *leaflets oblong-lanceolate, very sharply cut-serrate,* with a wedge-shaped entire base; flowers deep yellow; *fruit oblong-oval,* with 10 winged ridges. Moist river-banks, &c., not rare. June. — Leaves of a rather firm texture.

Var. **ápterum.** Fruit with strong and sharp ribs in place of wings. (Smýrnium aureum, *L.* Zizia aurea, *Koch.*) — With the winged form.

4. **T. trifoliàtum.** *Root-leaves* or some of them round and *heart-shaped; stem-leaves simply ternate or quinate, or 3-parted;* the divisions or *leaflets ovate-lanceolate or roundish,* mostly abrupt or heart-shaped at the base, *crenately toothed;* flowers deep yellow; *fruit globose-ovoid,* with 10 winged ridges. Rocky thickets, Vermont to Wisconsin, and southward; rare eastward. June.

Var. **atropurpùreum,** Torr. & Gr. Petals deep dark-purple. (Thápsia trifoliata, *L.* Smyrnium cordatum, *Walt.* Thaspium atropurpureum, *Nutt.*) — From New York westward and southward.

Var. **ápterum.** Petals yellow: fruit with sharp ribs in place of wings. (Zizia cordata, *Koch, Torr.*) With the preceding form.

17. ZÍZIA, DC. partly. (Zizia § Tænídia, Torr. & Gr.)

Calyx-teeth obsolete. Fruit ovoid-oblong, contracted at the junction of the carpels so as to become twin, the cross-section of each seed nearly orbicular: carpels somewhat fleshy when fresh, with 5 slender ribs (which are more conspicuous when dry): oil-tubes 3 in each interval and 4 on the inner face. — A perennial smooth and glaucous slender herb (2° - 3° high), with 2 - 3-ternately compound leaves, the leaflets with entire margins; umbels with long and slender rays, no involucre, and hardly any involucels. Flowers yellow. (Named for *I. B. Ziz,* a Rhenish botanist.)

1. **Z. integérrima,** DC. — Rocky hill-sides; not rare. May, June.

18. BUPLEÙRUM, Tourn. Thorough-wax.

Calyx-teeth obsolete. Fruit ovate-oblong, flattened laterally or somewhat twin, the carpels 5-ribbed, with or without oil-tubes. Plants with simple entire leaves and yellow flowers. (Name from βοῦς, *an ox,* and πλευρόν, *a rib;* it is uncertain why so called.)

1. **B.** ROTUNDIFÒLIUM, L. Leaves broadly ovate, perfoliate; involucre none; involucels of 5 large ovate leaflets. — Fields, New York, Penn., and Virginia; rare. (Adv. from Eu.)

19. DISCOPLEÙRA, DC. Mock Bishop-weed.

Calyx-teeth awl-shaped. Fruit ovoid; the carpels each with 3 strong ribs on the back, and 2 broad lateral ones united with a thickened corky margin: intervals with single oil-tubes. — Smooth and slender branched annuals, with the leaves finely dissected into bristle-form divisions, and white flowers. Involucre and involucels conspicuous. (Name from δίσκος, *a disk,* and πλευρόν, *a rib.*)

1. **D. capillàcea,** DC. Umbel few-rayed; leaflets of the involucre 3 - 5-cleft; involucels longer than the umbellets; fruit ovate in outline. — Brackish swamps, Massachusetts to Virginia, and southward. July - Oct.

2. **D. Nuttàllii,** DC. Umbel many-rayed; leaflets of the involucre mostly entire and shorter; fruit globular. — Wet prairies, Kentucky and southward.

20. CICÙTA, L. WATER HEMLOCK.

Calyx minutely 5-toothed. Fruit subglobose, a little contracted at the sides, the carpels with 5 flattish and strong ribs: intervals with single oil-tubes.— Marsh perennials, very poisonous, smooth, with thrice pinnately or ternately compound leaves, the veins of the lanceolate or oblong leaflets terminating in the notches. Involucre few-leaved: involucels many-leaved. Flowers white. (The ancient Latin name of the Hemlock.)

1. **C. maculàta,** L. (SPOTTED COWBANE. MUSQUASH-ROOT. BEAVER-POISON.) Stem streaked with purple, stout; *leaflets oblong-lanceolate, coarsely serrate,* sometimes lobed, pointed.— Swamps, common. Aug.—Plant 3°-6° high, coarse; the root a deadly poison.

2. **C. bulbìfera,** L. *Leaflets linear,* remotely toothed or cut-lobed; upper *axils bearing clusters of bulblets.*— Swamps; common northward: seldom ripening fruit.

21. SÌUM, L. WATER PARSNIP.

Calyx-teeth small or obsolete. Fruit ovate or globular, flattish or contracted at the sides; the carpels with 5 rather obtuse ribs: intervals with 1-several oil-tubes.— Marsh or aquatic perennials, smooth, poisonous, with grooved stems, simply pinnate leaves, and lanceolate serrate leaflets, or the immersed ones cut into capillary divisions. Involucre several-leaved. Flowers white. (Name supposed to be from the Celtic *siu,* water, from their habitation.)

* *Pericarp thin between the strong projecting ribs: lateral ribs marginal.*

1. **S. lineàre,** Michx. Leaflets linear, lanceolate or oblong-lanceolate, tapering gradually to a sharp point, closely and very sharply serrate; calyx-teeth scarcely any; *fruit globular,* with corky and *very salient ribs,* or rather *wings;* oil-tubes 1-3 in each interval.— Swamps and brooks; common. July - Sept.

S. LATIFOLIUM, L., of Europe, I have never seen in this region.

* *Pericarp of a thick texture, concealing the oil-tubes: ribs not strong, the lateral not quite marginal.* (Bérula, *Koch.*)

2. **S. angustifòlium,** L. Low (9′-20′ high); leaflets varying from oblong to linear, mostly cut-toothed and cleft; fruit somewhat twin.— Michigan and westward. (Eu.)

22. CRYPTOTÆNIA, DC. HONEWORT.

Calyx-teeth obsolete. Fruit oblong, contracted at the sides; the carpels equally and obtusely 5-ribbed: oil-tubes very slender, one in each interval and one under each rib. Seed slightly concave on the inner face.— A perennial smooth herb, with thin 3-foliolate leaves, the umbels and umbellets with very unequal rays, no involucre, and few-leaved involucels. Flowers white. (Name composed of κρυπτός, *hidden,* and ταινία, *a fillet,* from the concealed oil-tubes.)

1. **C. Canadénsis,** DC.— Rich woods, common. June - Sept.— Plant 2° high. Leaflets large, ovate, pointed, doubly serrate, the lower ones lobed.

23. CHÆROPHÝLLUM, L. CHERVIL.

Calyx-teeth obsolete. Fruit linear or oblong, pointed but not beaked, contracted at the sides; the carpels 5-ribbed: inner face of the seed deeply furrowed lengthwise: intervals with single oil-tubes. — Leaves ternately decompound; the leaflets lobed or toothed: involucre scarcely any: involucels many-leaved. Flowers chiefly white. (Name from χαίρω, *to gladden*, and φύλλον, *a leaf*, alluding to the agreeable aromatic odor of the foliage.)

1. **C. procúmbens**, Lam. Stems slender (6′–18′), spreading, a little hairy; lobes of the pinnatifid leaflets obtuse, oblong; umbels few-rayed (sessile or peduncled); fruit narrowly oblong, with narrow ribs. — Moist copses, New Jersey to Illinois and southward. May, June.

24. OSMORRHÌZA, Raf. SWEET CICELY.

Calyx-teeth obsolete. Fruit linear-oblong, angled, tapering downwards into a stalk-like base, contracted at the sides, crowned with the styles; the carpels with sharp upwardly bristly ribs: inner face of the nearly terete seed with a deep longitudinal channel: oil-tubes none. — Perennials, with thick very aromatic roots, and large 2–3-ternately compound leaves; the leaflets ovate, pinnatifid-toothed. Involucre and involucels few-leaved. Flowers white. (Name from ὀσμή, *a scent*, and ῥίζα, *a root*, in allusion to the anise-like flavor of the latter.)

1. **O. longistylis**, DC. (SMOOTHER SWEET CICELY.) *Styles slender, nearly as long as the ovary; leaflets sparingly pubescent* or smooth when old, *short-pointed*, cut-toothed, sometimes lobed. — Rich moist woods, commonest northward. May, June. — Plant 3° high, branching.

2. **O. brevistylis**, DC. (HAIRY SWEET CICELY.) *Styles conical, not longer than the breadth of the ovary;* fruit somewhat tapering at the summit; *leaflets downy-hairy, taper-pointed, pinnatifid-cut.* — More common than the last.

25. CONÌUM, L. POISON HEMLOCK.

Calyx-teeth obsolete. Fruit ovate, flattened at the sides, the carpels with 5 prominent wavy ribs, and no oil-tubes: inner face of the seed with a deep narrow longitudinal groove. — Biennial poisonous herbs, with large decompound leaves. Involucre and involucels 3–5-leaved, the latter 1-sided. Flowers white. (Κώνειον, the Greek name of the Hemlock, by which criminals and philosophers were put to death at Athens.)

1. **C. MACULÀTUM**, L. Smooth; stem spotted; leaflets lanceolate, pinnatifid; involucels shorter than the umbellets. — Waste places. July. — A large branching herb: the pale green leaves exhale a disagreeable odor when bruised. A virulent narcotico-acrid poison, used in medicine. (Nat. from Eu.)

26. EÚLOPHUS, Nutt. EULOPHUS.

Calyx-teeth small. Fruit ovoid, contracted at the sides and somewhat twin; the carpels smooth, indistinctly ribbed, and with a close row of oil-tubes: inner face of the seed longitudinally channelled, the cross-section semilunar. — A slender and smooth tall perennial, with the leaves 2-ternately divided into narrow linear leaflets or lobes. Involucre scarcely any: involucels short and bristle-form. Flowers white. (Name from *εὖ*, *well*, and *λόφος*, *a crest*, not well applied to a plant which has no crest at all.)

1. **E. Americànus**, Nutt. — Darby Plains, near Columbus, Ohio (*Sullivant*), and southwestward. July. — Root a cluster of small tubers.

27. ERIGÈNIA, Nutt. HARBINGER-OF-SPRING.

Calyx-teeth obsolete. Petals obovate or spatulate, flat, entire. Fruit twin; the carpels incurved at top and bottom, nearly kidney-form, with 5 very slender ribs, and several small oil-tubes in the interstices: inner face of the seed hollowed into a broad deep cavity. — A small and smooth vernal plant, producing from a deep round tuber a simple stem, bearing one or two 2-3-ternately divided leaves, and a somewhat imperfect and leafy bracted compound umbel. Flowers few, white. (Name from *ἠριγενής*, *born in the spring*.)

1. **E. bulbòsa**, Nutt. — Alluvial soil, Western New York and Penn., to Wisconsin, Kentucky, &c. March, April. — Stem 3′-9′ high.

The cultivated representatives of this family are chiefly the PARSLEY (*Àpium Petroselìnum*), CELERY (*A. gravèolens*), DILL (*Anèthum gravèolens*), FENNEL (*A. Fœniculum*), CARAWAY (*Càrum Càrui*), and CORIANDER (*Coriándrum sativum*).

ORDER 53. ARALIÀCEÆ. (GINSENG FAMILY.)

Herbs, shrubs, or trees, with much the same characters as Umbelliferæ, *but with usually more than* 2 *styles, and the fruit a* 3-*several-celled drupe.* (Albumen mostly fleshy. Petals flat.) — Represented only by the genus

1. ARÀLIA, Tourn. GINSENG. WILD SARSAPARILLA.

Flowers more or less polygamous. Calyx-tube coherent with the ovary, the teeth very short or almost obsolete. Petals 5, epigynous, oblong or obovate, imbricated in the bud, deciduous. Stamens 5, epigynous, alternate with the petals. Styles 2-5, mostly distinct and slender, or in the sterile flowers short and united. Ovary 2-5-celled, with a single anatropous ovule suspended from the top of each cell, ripening into a berry-like drupe, with as many seeds as cells. Embryo minute. — Leaves compound or decompound. Flowers white or greenish, in umbels. Roots (perennial), bark, fruit, &c. warm and aromatic. (Derivation obscure.)

§ 1. ARALIA, L. — *Flowers monœciously polygamous or perfect, the umbels usually in corymbs or panicles: styles and cells of the* (*black or dark purple*) *fruit* 5: *stems herbaceous or woody: ultimate divisions of the leaves pinnate.*

* *Umbels very numerous in a large compound panicle: leaves very large, quinately or pinnately decompound.*

1. **A. spinòsa**, L. (ANGELICA-TREE. HERCULES' CLUB.) *Shrub, or a low tree; the stout stem and stalks prickly;* leaflets ovate, pointed, serrate, pale

beneath. — River-banks, Pennsylvania to Kentucky and southward; common in cultivation. July, August.

2. **A. racemòsa,** L. (Spikenard.) *Herbaceous; stem widely branched; leaflets heart-ovate,* pointed, doubly serrate, slightly downy; umbels racemose-panicled; *styles united below.* — Rich woodlands. July. — Well known for its spicy-aromatic large roots. There are traces of stipules at the dilated base of the leafstalks.

* * *Umbels 2 – 7, corymbed: stem short, somewhat woody.*

3. **A. hispida,** Michx. (Bristly Sarsaparilla. Wild Elder.) *Stem* (1° – 2° *high*) *bristly, leafy,* terminating in a peduncle bearing several umbels; leaves twice pinnate; leaflets oblong-ovate, acute, cut-serrate. — Rocky places; common northward, and southward along the mountains. June.

4. **A. nudicaùlis,** L. (Wild Sarsaparilla.) *Stem scarcely rising out of the ground, smooth, bearing a single long-stalked leaf and a shorter naked scape,* with 2 – 7 umbels; leaflets oblong-ovate or oval, pointed, serrate, 5 on each of the 3 divisions. — Moist woodlands; with the same range as No. 3. May, June. — The aromatic horizontal roots, which are several feet long, are employed as a substitute for the officinal Sarsaparilla. Leafstalks 1° high.

§ 2. GÌNSENG, Decaisne & Planchon. (Panax, *L.*) — *Flowers diœciously polygamous: styles and cells of the* (*red or reddish*) *fruit* 2 *or* 3 : *stem herbaceous, low, simple, bearing at its summit a whorl of* 3 *palmately* 3 – 7*-foliolate leaves* (*or perhaps rather a single and sessile twice-compound leaf*), *and a single umbel on a slender naked peduncle.*

5. **A. quinquefòlia.** (Ginseng.) *Root large and spindle-shaped, often forked* (4′ – 9′ long, aromatic); stem 1° high; *leaflets long-stalked,* mostly 5, large and thin, obovate-oblong, pointed; styles mostly 2; *fruit bright red.* (Panax quinquefolium, *L.*) — Rich mountain woods; becoming rare. July.

6. **A. trifòlia.** (Dwarf Ginseng. Ground-nut.) *Root or tuber globular,* deep in the ground (pungent to the taste, not aromatic); stems 4′ – 8′ high; *leaflets* 3 – 5, *sessile* at the summit of the leafstalk, narrowly oblong, obtuse; styles usually 3; *fruit yellowish.*

Hèdera Hèlix, the European Ivy, is almost the only other representative of this family in the northern temperate zone.

Order 54. CORNÀCEÆ. (Dogwood Family.)

Shrubs or trees (rarely herbaceous), with opposite or alternate simple leaves the calyx-tube coherent with the 1 – 2*-celled ovary, its limb minute, the petals (valvate in the bud) and as many stamens borne on the margin of an epigynous disk in the perfect flowers; style one; a single anatropous ovule hanging from the top of the cell; the fruit a* 1 – 2*-seeded drupe; embryo nearly the length of the albumen, with large and foliaceous cotyledons.* — A small family, represented by Cornus, and by a partly apetalous genus, Nyssa. (Bark bitter and tonic.)

1. CÒRNUS, Tourn. CORNEL. DOGWOOD.

Flowers perfect (or in some foreign species diœcious). Calyx minutely 4 toothed. Petals 4, oblong, spreading. Stamens 4: filaments slender. Style slender: stigma terminal, flat or capitate. Drupe small, with a 2-celled and 2-seeded stone. — Leaves opposite (except in one species), entire. Flowers small, in open naked cymes, or in close heads which are surrounded by a corolla-like involucre. (Name from *cornu*, a horn; alluding to the hardness of the wood.)

§ 1. *Flowers greenish, collected in a head or close cluster, which is surrounded by a large and showy, 4-leaved, corolla-like, white involucre: fruit bright red.*

1. **C. Canadénsis,** L. (DWARF CORNEL. BUNCH-BERRY.) *Stems low and simple* (5′ - 7′ high) from a slender creeping and subterranean rather woody trunk; leaves scarcely petioled, the lower scale-like, the upper crowded into an apparent whorl in sixes or fours, ovate or oval, pointed; *leaves of the involucre ovate;* fruit globular. — Damp cold woods, common northward. June.

2. **C. flórida,** L. (FLOWERING DOGWOOD.) Leaves ovate, pointed, acutish at the base; *leaves of the involucre inversely heart-shaped or notched* (1½′ long); *fruit oval.* — Rocky woods; more common southward. May, June. — Tree 12° - 30° high, very showy in flower, scarcely less so in fruit.

§ 2. *Flowers white, in open and flat spreading cymes: involucre none: fruit spherical.*

* *Leaves all opposite: shrubs.*

3. **C. circinàta,** L'Her. (ROUND-LEAVED CORNEL OR DOGWOOD.) *Branches greenish,* warty-dotted; *leaves round-oval, abruptly pointed, woolly underneath* (4′ - 5′ broad); cymes flat; *fruit light blue.* — Copses; in rich soil. June. — Shrub 6° - 10° high. Leaves larger than in any other species.

4. **C. serícea,** L. (SILKY CORNEL. KINNIKINNIK.) *Branches purplish; the branchlets, stalks, and lower surface of the narrowly ovate or elliptical pointed leaves silky-downy* (often rusty), pale and dull; cymes flat, close; calyx-teeth lanceolate; *fruit pale blue.* — Wet places; common. June. — Shrub 3° - 10° high. Flowers yellowish-white.

5. **C. stolonífera,** Michx. (RED-OSIER DOGWOOD.) *Branches, especially the osier-like annual shoots, bright red-purple, smooth; leaves ovate,* rounded at the base, abruptly short-pointed, roughish with a minute close pubescence on both sides, *whitish underneath;* cymes small and flat, rather few-flowered, nearly smooth; *fruit white or lead-color.* — Wet banks of streams; common, especially northward. It multiplies by prostrate or subterranean suckers, and forms large dense clumps, 3° - 6° high. June.

6. **C. asperifòlia,** Michx. (ROUGH-LEAVED DOGWOOD.) *Branches brownish; the branchlets, &c. rough-pubescent; leaves oblong or ovate,* on very short petioles, pointed, *rough* with a harsh pubescence *above, and downy beneath;* calyx-teeth minute. — Dry or sandy soil, Illinois and southward. May, June.

7. **C. stricta,** Lam. (STIFF CORNEL.) Branches brownish or reddish, smooth; *leaves ovate or ovate-lanceolate,* taper-pointed, acutish at the base, *glabrous, of nearly the same hue both sides; cymes loose, flattish; anthers and fruit pale blue.* — Swamps, &c. Virginia and southward. April, May. — Shrub 8° - 15° high.

8. **C. paniculàta,** L'Her. (PANICLED CORNEL.) *Branches gray, smooth; leaves ovate-lanceolate,* taper-pointed, acute at the base, *whitish beneath* but not downy; *cymes convex, loose,* often panicled; *fruit white,* depressed-globose. — Thickets and river-banks. June. — Shrub 4° – 8° high, very much branched, bearing a profusion of pure white blossoms.

* * *Leaves mostly alternate, crowded at the ends of the branches.*

9. **C. alternifòlia,** L. (ALTERNATE-LEAVED CORNEL.) *Branches greenish streaked with white, alternate;* leaves ovate or oval, long-pointed, acute at the base, whitish and minutely pubescent underneath; *fruit deep blue.* — Hill-sides in copses. May, June. — Shrub or tree 8° – 20° high, generally throwing its branches to one side in a flattish top, and with broad, very open cymes.

2. NÝSSA, L. TUPELO. PEPPERIDGE. SOUR GUM-TREE.

Flowers diœciously polygamous, clustered or rarely solitary at the summit of axillary peduncles. *Stam. Fl.* numerous in a simple or compound dense cluster of fascicles. Calyx small, 5-parted. Stamens 5 – 12, oftener 10, inserted on the outside of a convex disk: filaments slender: anthers short. No pistil. *Pist. Fl.* solitary or 2 – 8, sessile in a bracted cluster, much larger than the staminate flowers. Calyx with a very short repand-truncate or minutely 5-toothed limb. Petals very small and fleshy, deciduous, or often wanting. Stamens 5 – 10, with perfect anthers, or imperfect. Style elongated, revolute, stigmatic down one side. Ovary one-celled. Drupe ovoid or oblong, with a bony and grooved or striate 1-celled and 1-seeded stone. — Trees, with entire or sometimes angulate-toothed leaves, which are alternate, but mostly crowded at the end of the branchlets, and greenish flowers appearing with the leaves. (The name of a Nymph: "so called because it [the original species] grows in the water.")

1. **N. multiflòra,** Wang. (TUPELO. PEPPERIDGE. BLACK or SOUR GUM.) Leaves oval or obovate, commonly acuminate, glabrous or villous-pubescent when young, at least on the margins and midrib, shining above when old (2′ – 5′ long); *fertile flowers* 3 – 8, at the summit of a slender peduncle; *fruit ovoid, bluish-black* (about ½′ long). (N. aquática, *L.*, at least in part; but the tree is not aquatic. N. sylvática, *Marsh.* N. villòsa, *Willd*, &c., &c.) — Rich soil, either moist or nearly dry, Massachusetts to Illinois, and southward. April, May. — A middle-sized tree, with horizontal branches and a light flat spray, like the Beech: the wood firm, close-grained, and very unwedgeable, on account of the oblique direction and crossing of the fibre of different layers. Leaves turning bright crimson in autumn.

2. **N. uniflòra,** Walt. (LARGE TUPELO.) Leaves oblong or ovate, sometimes slightly cordate at the base, long-petioled, entire or angulate-toothed, pale and downy-pubescent beneath, at least when young (4′ – 12′ long); *fertile flower solitary* on a slender peduncle; *fruit oblong, blue* (1′ or more in length). (N. denticulàta, *Ait.* N. tomentòsa and angùlisans, *Michx.* N. grandidentàta, *Michx. f.*) — In water or wet swamps, Virginia, Kentucky, and southward. April. — Wood soft: that of the roots very light and spongy, used for corks

Division II. MONOPÉTALOUS EXÓGENOUS PLANTS.

Floral envelopes consisting of both calyx and corolla, the latter composed of more or less united petals, that is, monopetalous.*

Order 55. CAPRIFOLIÀCEÆ. (Honeysuckle Family.)

Shrubs, or rarely herbs, with opposite leaves, no (genuine) stipules, the calyx-tube coherent with the 2–5-celled ovary, the stamens as many as (or one fewer than) the lobes of the tubular or wheel-shaped corolla, and inserted on its tube. — Fruit a berry, drupe, or pod, 1–several-seeded. Seeds anatropous, with a small embryo in fleshy albumen.

Synopsis.

Tribe I. LONICEREÆ. Corolla tubular, often irregular, sometimes 2-lipped. Style slender: stigma capitate.

1. LINNÆA. Stamens 4, one fewer than the lobes of the corolla. Fruit dry, 3-celled, but only 1-seeded.
2. SYMPHORICARPUS. Stamens 4 or 5, as many as the lobes of the bell-shaped regular corolla. Berry 4-celled, but only 2-seeded.
3. LONICERA. Stamens 5, as many as the lobes of the tubular and more or less irregular corolla. Berry several-seeded.
4. DIERVILLA. Stamens 5. Corolla funnel-form, nearly regular. Pod 2-celled, 2-valved, many-seeded.
5. TRIOSTEUM. Stamens 5. Corolla gibbous at the base. Fruit a 3–5-celled bony drupe.

Tribe II. SAMBUCEÆ. Corolla wheel-shaped or urn-shaped, regular, deeply 5-lobed. Stigmas 1–3, rarely 5, sessile. Flowers in broad cymes.

6. SAMBUCUS. Fruit berry-like, containing 3 seed-like nutlets. Leaves pinnate.
7. VIBURNUM. Fruit a 1-celled 1-seeded flattish drupe, with a thin pulp. Leaves simple.

1. LINNÆA, Gronov. Linnæa. Twin-flower.

Calyx-teeth 5, awl-shaped, deciduous. Corolla narrow bell-shaped, almost equally 5-lobed. Stamens 4, two of them shorter, inserted toward the base of the corolla. Ovary and the small dry pod 3-celled, but only 1-seeded, two of the cells being empty. — A slender creeping and trailing little evergreen, somewhat hairy, with rounded-oval sparingly crenate leaves contracted at the base into short petioles, and thread-like upright peduncles forking into 2 pedicels at the top, each bearing a delicate and fragrant nodding flower. Corolla purple and whitish, hairy inside. (Dedicated to the immortal *Linnæus*, who first pointed out its characters, and with whom this humble but charming plant was an especial favorite.)

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* In certain families, such as Ericaceæ, &c. the petals in some genera are nearly or quite separate. In Compositæ and some others, the calyx is mostly reduced to a pappus, or to scales, or a mere border, or even to nothing more than a covering of the surface of the ovary. The student might look for these in the first or the third division. But the *artificial analysis* prefixed to the volume provides for all these anomalies, and will lead the student to the order where they belong

1. **L. boreàlis,** Gronov. — Moist mossy woods and cold bogs; common northward, but towards the south of rare occurrence as far as New Jersey, and along the mountains to Maryland. June. (Eu.)

2. SYMPHORICÁRPUS, Dill. SNOWBERRY.

Calyx-teeth short, persistent on the fruit. Corolla bell-shaped, regularly 4–5-lobed, with as many short stamens inserted into its throat. Ovary 4-celled, only 2 of the cells with a fertile ovule; the berry therefore 4-celled but only 2-seeded. Seeds bony. — Low and branching upright shrubs, with oval short-petioled leaves, which are downy underneath and entire, or wavy-toothed or lobed on the young shoots. Flowers white, tinged with rose-color, in close short spikes or clusters. (Name composed of *συμφορέω, to bear together*, and *καρπός, fruit;* from the clustered berries.)

1. **S. occidentàlis,** R. Brown. (WOLFBERRY.) Flowers in dense terminal and axillary spikes; corolla much bearded within; the *stamens and style protruded; berries white.* — Northern Michigan to Wisconsin and westward. — Flowers larger and more funnel-form, and stamens longer, than in the next, which it too closely resembles.

2. **S. racemòsus,** Michx. (SNOWBERRY.) *Flowers in a loose and somewhat leafy interrupted spike* at the end of the branches; corolla bearded inside; *berries large, bright white.* — Rocky banks, from W. Vermont to Pennsylvania and Wisconsin: common in cultivation. June–Sept. Berries remaining until winter.

3. **S. vulgàris,** Michx. (INDIAN CURRANT. CORAL-BERRY.) *Flowers in small close clusters in the axils* of nearly all the leaves; corolla sparingly bearded; *berries small, dark red.* — Rocky banks, W. New York and Penn. to Illinois, and southward: also cultivated. July.

3. LONICÈRA, L. HONEYSUCKLE. WOODBINE.

Calyx-teeth very short. Corolla tubular or funnel-form, often gibbous at the base, irregularly or almost regularly 5-lobed. Stamens 5. Ovary 2–3-celled. Berry several-seeded. — Leaves entire. Flowers often showy and fragrant. (Named in honor of *Lonicer*, a German botanist of the 16th century.)

§ 1. CAPRIFÒLIUM, Juss. — *Twining shrubs, with the flowers in sessile whorled clusters from the axils of the (often connate) upper leaves, and forming interrupted terminal spikes: calyx-teeth persistent on the (red or orange) berry.*

* *Corolla trumpet-shaped, almost regularly and equally 5-lobed.*

1. **L. sempérvirens,** Ait. (TRUMPET HONEYSUCKLE.) Flowers in somewhat distant whorls; leaves oblong, smooth; the lower petioled, the uppermost pairs united round the stem. — Copses, New York (near the city) to Virginia, and southward: common also in cultivation. May–Oct. — Leaves deciduous at the North. Corolla scentless, nearly 2′ long, scarlet or deep red

outside, yellowish within: a cultivated and less showy variety has pale yellow blossoms.

* * *Corolla ringent: the lower lip narrow, the upper broad and 4-lobed.*

2. **L. gràta,** Ait. (AMERICAN WOODBINE.) *Leaves smooth, glaucous beneath*, obovate, the 2 or 3 upper pairs united; flowers whorled in the axils of the uppermost leaves or leaf-like connate bracts; *corolla smooth* (*whitish with a purple tube*, fading yellowish), not gibbous at the base, fragrant. — Rocky woodlands, New York, Penn., and westward: also cultivated. May.

3. **L. flàva,** Sims. (YELLOW HONEYSUCKLE.) *Leaves smooth, very pale and glaucous both sides, thickish*, obovate or oval, the 2 – 4 upper pairs united into a round cup-like disk; flowers in closely approximate whorls; tube of the smooth (*light yellow*) *corolla* slender, slightly or not at all gibbous; filaments smooth. — Rocky banks. Catskill Mountains (*Pursh*), Ohio to Wisconsin (a variety with rather short flowers), and southward along the Alleghany Mountains. June.

4. **L. parviflòra,** Lam. (SMALL HONEYSUCKLE.) *Leaves smooth*, oblong, *green above, very glaucous beneath*, the upper pairs united, all closely sessile; flowers in 2 or 3 closely approximate whorls raised on a peduncle; *corolla gibbous at the base, smooth outside* (*greenish-yellow tinged with dull purple*), *short* (⅝' long); filaments rather hairy below. — Rocky banks, mostly northward. May, June. — Stem commonly bushy, only 2° – 4° high.

Var. **Douglásii.** Leaves greener, more or less downy underneath when young; corolla crimson or deep dull purple. (L. Douglasii, *DC.*) — Ohio to Wisconsin northward.

5. **L. hirsùta,** Eaton. (HAIRY HONEYSUCKLE.) *Leaves not glaucous, downy-hairy beneath*, as well as the branches, and slightly so above, veiny, dull, broadly oval; the uppermost united, the lower short-petioled; flowers in approximate whorls; *tube of the* (*orange-yellow*) *clammy-pubescent corolla gibbous* at the base, slender. — Damp copses and rocks, Maine to Wisconsin northward. July. — A coarse, large-leaved species.

§ 2. XYLÓSTEON, Juss. — *Upright bushy shrubs: leaves all distinct at the base: peduncles axillary, single, 2-bracted and 2-flowered at the summit; the two berries sometimes united into one: calyx-teeth not persistent.*

6. **L. ciliàta,** Muhl. (FLY-HONEYSUCKLE.) Branches straggling (3° – 5° high); *leaves oblong-ovate, often heart-shaped, petioled, thin,* downy beneath; *peduncles shorter than the leaves;* bracts minute; corolla funnel-form, gibbous at the base (greenish-yellow, ¾' long), the lobes almost equal; *berries separate* (*red*). — Rocky woods; New England to Pennsylvania and Wisconsin, northward. May.

7. **L. cærùlea,** L. (MOUNTAIN FLY-HONEYSUCKLE.) Low (1° – 2° high); branches upright; *leaves oval*, downy when young; *peduncles very short; bracts awl-shaped, longer than the ovaries of the two flowers, which are united into one* (*blue*) *berry*. (Xylósteum villòsum, *Michx.*) — Mountain woods and bogs, Massachusetts, New Hampshire, New York, and northward: also Wisconsin. May. — Flowers yellowish, smaller than in No. 8. (Eu.)

8. **L. oblongifòlia**, Muhl. (Swamp Fly-Honeysuckle.) Branches upright; *leaves oblong*, downy when young, smooth when old; *peduncles long and slender; bracts almost none; corolla deeply 2-lipped; berries (purple) formed by the union of the two ovaries.* — Bogs, N. New York to Wisconsin. June. — Shrub 2° - 4° high. Leaves 2′ - 3′ long. Corolla ½′ long, yellowish-white.

L. Tatárica, the Tartarian Honeysuckle; L. Caprifòlium, the Common Honeysuckle; and L. Periclýmenum, the true Woodbine, are the commonly cultivated species.

4. DIERVÍLLA, Tourn. Bush Honeysuckle.

Calyx-tube tapering at the summit; the lobes slender, awl-shaped, persistent. Corolla funnel-form, 5-lobed, almost regular. Stamens 5. Pod ovoid-oblong, pointed, 2-celled, 2-valved, septicidal, many-seeded. — Low, upright shrubs, with ovate or oblong pointed serrate leaves, and cymosely 3 - several-flowered peduncles, from the upper axils, or terminal. (Named in compliment to *M. Dierville*, who sent it from Canada to Tournefort.)

1. **D. trífida**, Mœnch. Leaves oblong-ovate, taper-pointed, petioled; peduncles mostly 3-flowered; pod long-beaked. (D. Canadénsis, *Muhl.*) — Rocks; common, especially northward. June - Aug. — Flowers honey-color, not showy.

D. sessilifòlia, Buckley, of the mountains of North Carolina, may occur in those of S. W. Virginia.

5. TRIÓSTEUM, L. Fever-wort. Horse-Gentian.

Calyx-lobes linear-lanceolate, leaf-like, persistent. Corolla tubular, gibbous at the base, somewhat equally 5-lobed, scarcely longer than the calyx. Stamens 5. Ovary mostly 3-celled, in fruit forming a rather dry drupe, containing as many angled and ribbed 1-seeded bony nutlets. — Coarse, hairy, perennial herbs, leafy to the top; with the ample entire pointed leaves tapering to the base, but connate round the simple stem. Flowers sessile, and solitary or clustered in the axils. (Name from τρεῖς, *three*, and ὀστέον, *a bone*, alluding to three bony seeds, or rather nutlets.)

1. **T. perfoliàtum**, L. *Softly hairy* (2° - 4° high); *leaves oval, abruptly narrowed below*, downy beneath; flowers dull brownish-purple, mostly clustered. — Rich woodlands; not rare. June. — Fruit orange-color, ½′ long.

2. **T. angustifòlium**, L. Smaller; *bristly-hairy; leaves lanceolate, tapering to the base;* flowers greenish-cream-color, mostly single in the axils. — S. Pennsylvania to Illinois, and southward. May.

6. SAMBÙCUS, Tourn. Elder.

Calyx-lobes minute or obsolete. Corolla urn-shaped, with a broadly spreading 5-cleft limb. Stamens 5. Stigmas 3. Fruit a berry-like juicy drupe, containing 3 small seed-like nutlets. — Shrubby plants, with a rank smell when bruised, pinnate leaves, serrate pointed leaflets, and numerous small and white

flowers in compound cymes. (Name from σαμβύκη, an ancient musical instrument, supposed to have been made of Elder-wood.)

1. **S. Canadénsis,** L. (COMMON ELDER.) Stems scarcely woody (5°–10° high); *leaflets* 7–11, *oblong, smooth,* the lower often 3-parted; *cymes flat; fruit black-purple.* — Rich soil, in open places. June.

2. **S. pùbens,** Michx. (RED-BERRIED ELDER.) Stems woody (2°–18° high), the bark warty; *leaflets* 5–7, *ovate-lanceolate, downy underneath; cymes panicled, convex or pyramidal; fruit bright red* (rarely white). — Rocky woods; chiefly northward, and southward in the mountains. May: the fruit ripening in June.

7. VIBÚRNUM, L. ARROW-WOOD. LAURESTINUS.

Calyx 5-toothed. Corolla spreading, deeply 5-lobed. Stamens 5. Stigmas 1–3. Fruit a 1-celled, 1-seeded drupe, with thin pulp and a crustaceous flattened stone. — Shrubs, with simple leaves, and white flowers in flat compound cymes. Petioles sometimes bearing little appendages like stipules. Leaf-buds naked, or in No. 9 scaly. (The classical Latin name, of unknown meaning.)

§ 1. *Flowers all alike and perfect.* (*Fruit blue or black, glaucous.*)

* *Leaves entire, or toothed, not lobed.*

1. **V. nùdum,** L. (WITHE-ROD.) *Leaves* thickish, oval, oblong or lanceolate, *dotted beneath, like the short petioles and cymes, with small brownish scales,* smooth above, *not shining, the margins entire or wavy-crenate; cyme short-peduncled;* fruit round-ovoid. — Var. 1. CLAYTÒNI has the leaves nearly entire, the veins somewhat prominent underneath, and grows in swamps from Massachusetts near the coast to Virginia and southward. Var. 2. CASSINOÌDES (V. pyrifòlium, *Pursh, &c.*) has more opaque and often toothed leaves; and grows in cold swamps from Pennsylvania northward. May, June. — Shrub 6°–10° high.

2. **V. prunifòlium,** L. (BLACK HAW.) *Leaves broadly oval, obtuse at both ends, finely and sharply serrate, shining* above, smooth; petioles naked; *cymes sessile;* fruit ovoid-oblong. — Dry copses, S. New York to Ohio, and southward. May. — A tree-like shrub, very handsome in flower and foliage.

3. **V. Lentàgo,** L. (SWEET VIBURNUM. SHEEP-BERRY.) *Leaves ovate, strongly pointed,* closely and very *sharply serrate, smooth,* the long margined petioles with the midrib and branches of the *sessile cyme* sprinkled with rusty glands when young; fruit oval. — Copses, common. May, June. — Tree 15°–20° high, handsome; the fruit ½′ long, turning from red to blue-black, and edible in autumn.

4. **V. obovàtum,** Walt. *Leaves obovate, obtuse, entire or denticulate, glabrous,* thickish, small (1′–1½′ long), shining; *cymes sessile,* small. — River-banks, Virginia and southward. May. — Shrub 2°–8° high.

5. **V. dentàtum,** L. (ARROW-WOOD.) *Smooth; leaves broadly ovate, coarsely and sharply toothed, strongly straight-veined, on slender petioles;* cymes peduncled; fruit (small) ovoid-globose, blue. — Wet places; common. June. — Shrub 5°–10° high, with ash-colored bark; the pale leaves often with hairy tufts in the axils of the strong veins.

6. **V. pubéscens,** Pursh. (DOWNY ARROW-WOOD.) *Leaves ovate or oblong-ovate,* acute or pointed, coarsely toothed, rather strongly straight-veined, *the lower surface and the very short petioles velvety-downy;* cymes peduncled; fruit ovoid. — Rocks, W. Vermont to Wisconsin and Kentucky. June. — Shrub straggling, 2° – 4° high. (V. molle, *Michx.* is probably a form of this.)

* * *Leaves 3-lobed, roundish; the lobes pointed.*

7. **V. acerifòlium,** L. (MAPLE-LEAVED ARROW-WOOD. DOCKMACKIE.) *Leaves 3-ribbed and roundish or heart-shaped at the base, downy underneath,* coarsely and unequally toothed, the veins and stalks hairy; cymes long-peduncled, many-flowered; fruit oval; *filaments long.* — Rocky woods, common. May, June. — Shrub 3° – 5° high.

8. **V. pauciflòrum,** Pylaie. *Smooth,* or nearly so; *leaves mostly truncate and 5-ribbed at the base,* with 3 short lobes at the summit, *unequally serrate throughout; cymes small and simple,* peduncled; *filaments shorter than the corolla.* — Cold woods, mountains of N. Hampshire and New York; Wisconsin and northward. (V. Oxycóccus, var. eradiàtum, *Oakes.*) — A low straggling shrub, with larger leaves than No. 6, serrate all round, and less deeply lobed than in No. 8.

§ 2. ÓPULUS, Tourn. — *Marginal flowers of the cyme destitute of stamens and pistils, and with corollas many times larger than the others, forming a kind of ray, as in* Hydrangea.

9. **V. Ópulus,** L. (CRANBERRY-TREE.) *Nearly smooth, upright; leaves strongly 3-lobed,* broadly wedge-shaped or truncate at the base, the spreading lobes pointed, toothed on the sides, entire in the sinuses; petioles bearing stalked glands at the base; *cymes peduncled;* fruit ovoid, red. (V. Oxycóccus and V. édule, *Pursh.*) — Shrub 5° – 10° high, showy in flower. The acid fruit is used as a (poor) substitute for cranberries, whence the name *High Cranberry-bush,* &c. — The well-known SNOW-BALL TREE, or GUELDER-ROSE, is a cultivated state, with the whole cyme turned into large sterile flowers. (Eu.)

10. **V. lantanoìdes,** Michx. (HOBBLE-BUSH. AMERICAN WAYFARING-TREE.) *Leaves round-ovate,* abruptly pointed, *heart-shaped at the base, closely serrate,* many-veined; the veins and veinlets underneath, along with the stalks and branchlets, very *scurfy with rusty-colored tufts of minute down; cymes sessile,* very broad and flat; fruit ovoid, crimson turning blackish. — Cold moist woods, New England to Penn. and northward, and southward in the Alleghanies. May. — A straggling shrub; the long, procumbent branches often taking root. Flowers handsome. Leaves 4′ – 8′ across.

ORDER 56. RUBIÀCEÆ. (MADDER FAMILY.)

Shrubs or herbs, with opposite entire leaves connected by interposed stipules, or rarely in whorls without apparent stipules, the calyx coherent with the 2 – 4 celled ovary, the stamens as many as the lobes of the regular corolla (3 – 5) *and inserted on its tube.* — Fruit various. Seeds anatropous or amphitropous. Embryo commonly pretty large, in copious hard albumen. — A very large family, the greater part, and all its most important plants (such as the Coffee and Peruvian-Bark trees), tropical, divided into two suborders. To these, in our Flora, it is convenient to append a third for a few plants which are exactly Rubiaceæ except that the calyx is free from the ovary.

SUBORDER I. STELLATÆ. THE TRUE MADDER FAMILY.

Leaves whorled, with no apparent stipules. Ovary entirely coherent with the calyx-tube. Calyx valvate in the bud. — Chiefly herbs.

1. **GALIUM.** Corolla wheel-shaped, 4- (or rarely 3-) parted. Fruit twin, 2-seeded, separating into 2 indehiscent carpels.

SUBORDER II. CINCHONEÆ. THE CINCHONA FAMILY.

Leaves opposite, or sometimes in whorls, with stipules between them. Ovary coherent with the calyx-tube, or its summit rarely free.

* Ovules and seeds solitary in each cell.

+ Flowers axillary, separate. Fruit dry when ripe. Herbs.

2. **SPERMACOCE.** Corolla funnel-form or salver-form: lobes 4. Fruit separating when ripe into 2 carpels, one of them closed, the other open.
3. **DIODIA.** Fruit separating into 2 or 3 closed and indehiscent carpels.

+ + Flowers in a close and round long-peduncled head. Fruit dry. Shrubs.

4. **CEPHALANTHUS.** Corolla tubular: lobes 4. Fruit inversely pyramidal, 2-4-seeded.

+ + + Flowers twin; their ovaries united into one. Fruit a berry.

5. **MITCHELLA.** Corolla funnel-form; its lobes 4. — A creeping herb.

* * Ovules and seeds many or several in each cell of the pod.

6. **OLDENLANDIA.** Lobes of the corolla and stamens 4, or rarely 5. Pod loculicidal.

SUBORDER III. LOGANIEÆ. THE LOGANIA FAMILY.

Leaves opposite, with stipules between them. Ovary free from the calyx. Corolla valvate or imbricated in the bud.

7. **MITREOLA.** Corolla short. Ovary and pod mitre-shaped or 2-beaked; the 2 short styles separate below, but at first united at the top. Seeds many.
8. **SPIGELIA.** Corolla tubular-funnel-form. Style 1. Pod twin, the 2 cells few-seeded.

SUBORDER I. STELLÀTÆ. THE TRUE MADDER FAMILY.

1. GÀLIUM, L. BEDSTRAW. CLEAVERS.

Calyx-teeth obsolete. Corolla 4-parted, rarely 3-parted, wheel-shaped. Stamens 4, rarely 3, short. Styles 2. Fruit dry or fleshy, globular, twin, separating when ripe into the 2 seed-like, indehiscent, 1-seeded carpels. — Slender herbs, with small cymose flowers, square stems, and whorled leaves: the roots often containing a red coloring matter. (Name from γάλα, *milk*, which some species are used to curdle.)

* *Annual: leaves about* 8 *in a whorl: peduncles* 1-2-*flowered, axillary.*

1. **G. Aparìne,** L. (CLEAVERS. GOOSE-GRASS.) Stem weak and reclining, bristle-prickly backwards, hairy at the joints; leaves lanceolate, tapering to the base, short-pointed, rough on the margins and midrib (1′-2′ long);

flowers white; *fruit (large) bristly with hooked prickles.*—Moist thickets. Doubtful if truly indigenous in our district. (Eu.)

* * *Perennial: leaves* 4–6 (*in the last species* 8) *in a whorl.*

+ *Peduncles axillary and terminal, few-flowered: flowers white or greenish.*

2. **G. asprèllum,** Michx. (Rough Bedstraw.) Stem weak, much branched, rough backwards with hooked prickles, leaning on bushes (3°–5° high); *leaves in whorls of* 6, *or* 4–5 *on the branchlets, oval-lanceolate,* pointed, with almost prickly margins and midrib; peduncles many, short, 2–3 times forked; *fruit usually smooth.*—Low thickets, common northward. July.—Branchlets covered with numerous but very small white flowers.

3. **G. concinnum,** Torr. & Gr. Stems low, diffuse, with minutely roughened angles; *leaves all in whorls of* 6, *linear, slightly pointed,* veinless, the margins upwardly roughened; *peduncles slender,* 2–3 *times forked,* somewhat panicled at the summit; pedicels short; *fruit smooth.*—Dry soil, Michigan to Kentucky. June.—Plant 6′–12′ high, slender, but rather rigid, not turning blackish in drying, like the rest.

4. **G. trifidum,** L. (Small Bedstraw.) Stems weak, ascending (5′–20′ high), branching, roughened backwards on the angles; *leaves in whorls of* 4 *to* 6, *linear or oblanceolate, obtuse,* the margins and midrib rough; *peduncles* 1–3*-flowered;* pedicels slender; corolla-lobes and stamens often 3; *fruit smooth.*—Var. 1. TINCTÒRIUM: stem stouter, with nearly smooth angles, and the parts of the flower usually in fours. Var. 2. LATIFÒLIUM (G. obtùsum, *Bigel.*): stem smooth, widely branched; leaves oblong, quite rough on the midrib and margins.—Swamps; common, and very variable. June–Aug. (Eu.)

5. **G. triflòrum,** Michx. (Sweet-scented Bedstraw.) Stem weak, reclining or prostrate (1°–3° long), bristly-roughened backwards on the angles, shining; *leaves* 6 *in a whorl, elliptical-lanceolate, bristle-pointed,* with slightly roughened margins (1′–2′ long); *peduncles* 3*-flowered,* the flowers all pedicelled; *fruit bristly with hooked hairs.*—Rich woodlands, common. July.—Lobes of the greenish corolla pointed. (Eu.)

+ + *Peduncles several-flowered: flowers dull purple or brownish (rarely cream-color): petals mucronate or bristle-pointed: fruit densely hooked-bristly.*

6. **G. pilòsum,** Ait. Stem ascending, somewhat simple, *hairy; leaves in fours, oval,* dotted, hairy (1′ long), *scarcely* 3*-nerved; peduncles twice or thrice* 2–3*-forked; the flowers all pedicelled.*—Dry copses, Rhode Island and Vermont to Illinois and southward. June–Aug.—Var. PUNCTICULÒSUM is a nearly smooth form (G. puncticulosum, *Michx.*): Virginia and southward.

7. **G. circæ̀zans,** Michx. (Wild Liquorice.) Smooth or downy, erect or ascending (1° high); *leaves in fours, oval,* varying to ovate-oblong, *mostly obtuse,* 3*-nerved,* ciliate (1′–1½′ long); *peduncles usually once forked, the branches elongated* and widely diverging in fruit, *bearing several remote flowers on very short lateral pedicels,* reflexed in fruit; lobes of the *corolla hairy outside* above the middle.—Rich woods; common. June–Aug.—The var. MONTÀNUM is a dwarf, broad-leaved form, from mountain woods.

8. **G. lanceolàtum,** Torr. (Wild Liquorice) *Leaves in fours,*

lanceolate or ovate-lanceolate, tapering to the apex (2′ long); *corolla glabrous:* otherwise like the last. — Woodlands; common northward.

+ + + *Peduncles many-flowered: flowers in open cymes, dull purple: fruit smooth.*

9. **G. latifòlium,** Michx. Stems erect (1° – 2° high), smooth; leaves in fours, lanceolate or ovate-lanceolate, 3-nerved, the midrib and margins rough; flowers all on long and slender spreading pedicels; corolla-lobes bristle-pointed. — Dry woodlands, Alleghany Mountains from Maryland southward. July.

+ + + + *Peduncles many-flowered, in close terminal panicles.*

10. **G. boreàle,** L. (NORTHERN BEDSTRAW.) Stem upright (1° – 2° high), smooth; *leaves in fours, linear-lanceolate,* 3-nerved; panicle elongated; *flowers white; fruit minutely bristly,* sometimes smooth. — Rocky banks of streams; common, especially northward. June – Aug. (Eu.)

11. **G.** VÈRUM, L. (YELLOW BEDSTRAW.) Stem upright, slender; *leaves in eights, linear,* grooved above, roughish, deflexed; *flowers yellow, crowded; fruit smooth.* — Dry fields, E. Massachusetts. July. (Adv. from Eu.)

RÙBIA TINCTÒRIA, L., the cultivated MADDER, — from which the order is named, — has a berry-like fruit; the parts of the flower 5.

SUBORDER II. CINCHÒNEÆ. THE CINCHONA FAMILY.*

2. SPERMACÒCE, L. BUTTON-WEED.

Calyx-tube short; the limb parted into 4 teeth. Corolla funnel-form or salver-form; the lobes valvate in the bud. Stamens 4. Stigma or style 2-cleft. Fruit small and dry, 2-celled, 2-seeded, splitting when ripe into 2 carpels, one of them carrying with it the partition, and therefore closed, the other open on the inner face. — Small herbs, the bases of the leaves or petioles connected by a bristle-bearing stipular membrane. Flowers small, crowded into sessile axillary whorled clusters or heads. Corolla whitish. (Name compounded of σπέρμα, *seed,* and ἀκωκή, *a point,* probably from the pointed calyx-teeth on the fruit.)

1. **S. glàbra,** Michx. Glabrous; stems spreading (9′ – 20′ long); leaves oblong-lanceolate; whorled heads many-flowered; corolla little exceeding the calyx, bearded in the throat, bearing the anthers at its base; filaments and style hardly any. ♃ — River-banks, S. Ohio, Illinois, and southward. Aug.

3. DIÓDIA, L. BUTTON-WEED.

Calyx-teeth 2 – 5, often unequal. Fruit 2- (rarely 3-) celled; the crustaceous carpels into which it splits all closed and indehiscent. Otherwise nearly as in Spermacoce. (Name from δίοδος, *a thoroughfare;* the species often growing by the way-side.)

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* In several genera, such as Mitchella, Oldenlandia, &c., the flowers, although perfect, are of two sorts in different individuals; — one sort having exserted stamens, borne in the throat of the corolla, and short included styles; the other having included stamens inserted low down in the corolla, and long, usually exserted styles. Such we call *diœciously dimorphous.*

1. **D. Virginica,** L. Either smooth or hairy; stems spreading (1′–2′ long); leaves lanceolate or oblong-lanceolate, sessile; flowers 1–3 in each axil; corolla white (½′ long), the *slender tube abruptly expanded into the large limb; style 2-parted; fruit oblong, strongly furrowed*, crowned mostly with 2 slender calyx-teeth. ♃ — River-banks, Virginia and southward. May – Oct.

2. **D. tères,** Walt. Hairy or minutely pubescent; stem spreading (3′–9′ long), nearly terete; leaves linear-lanceolate, closely sessile, rigid; flowers 1–3 in each axil; *corolla funnel-form* (2″–3″ long, whitish), with short lobes, not exceeding the long bristles of the stipules; *style undivided; fruit* obovate-turbinate, *not furrowed*, crowned with 4 short calyx-teeth. ① — Sandy fields, from New Jersey and Illinois southward. Aug.

4. CEPHALÁNTHUS, L. BUTTON-BUSH.

Calyx-tube inversely pyramidal, the limb 4-toothed. Corolla tubular, 4-toothed; the teeth imbricated in the bud. Style thread-form, much protruded. Stigma capitate. Fruit dry and hard, small, inversely pyramidal, 2–4-celled, separating from the base upward into 2–4 closed 1-seeded portions. — Shrubs, with the flowers densely aggregated in spherical peduncled heads. Flowers white. (Name composed of κεφαλή, *a head*, and ἄνθος, *a flower*.)

1. **C. occidentàlis,** L. Smooth or pubescent; leaves petioled, ovate-oblong, pointed, opposite or whorled in threes, with short intervening stipules. — Wet places; common. July – Aug.

5. MITCHÉLLA, L. PARTRIDGE-BERRY.

Flowers in pairs, with their ovaries united. Calyx 4-toothed. Corolla funnel-form, 4-lobed; the lobes spreading, densely bearded inside, valvate in the bud. Stamens 4. Style 1: stigmas 4. Fruit a berry-like double drupe, crowned with the calyx-teeth of the two flowers, each containing 4 small and seed-like bony nutlets. — A smooth and trailing small evergreen herb, with round-ovate and shining petioled leaves, minute stipules, white fragrant flowers often tinged with purple, and scarlet edible (but nearly tasteless) dry berries, which remain over winter. Parts of the flower occasionally in threes, fives, or sixes. (This very pretty plant commemorates *Dr. John Mitchell*, an early correspondent of Linnæus, and an excellent botanist, who resided in Virginia.)

1. **M. rèpens,** L. — Dry woods, creeping about the foot of trees: common. June, July. — Leaves often variegated with whitish lines.

6. OLDENLÁNDIA, Plum., L. BLUETS.

Calyx 4- (rarely 5-) lobed, persistent. Corolla funnel-form, salver-form, or nearly wheel-shaped; the limb 4- (rarely 5-) parted, imbricated in the bud. Stamens 4 (rarely 5). Style 1 or none: stigmas 2. Pod globular, ovoid, or obcordate, above often free and rising above the calyx, 2-celled, many-seeded, opening loculicidally across the summit. Seeds concave on the inner face. — Low herbs, with small stipules united to the petioles. Flowers white, purple, or blue. (Dedicated, in 1703, to the memory of *Oldenland*, a German physician and botanist, who died early at the Cape of Good Hope. HOUSTONIA, made a section of this genus, was much later dedicated to *Dr. Houston*, an English botanist of the days of Linnæus who collected in Central America.)

§ 1. OLDENLANDIA, L. *Corolla wheel-shaped* (*or funnel-form*), *shorter or scarcely longer than the calyx-lobes: anthers short: pod wholly enclosed in and coherent with the calyx-tube: seeds very numerous, minute and angular.* (*Flowers lateral or terminal.*)

1. **O. glomeràta,** Michx. Pubescent or smoothish; stems branched and spreading (2′–12′ high); leaves oblong (¼′–¾′ long); flowers in sessile clusters in the axils; corolla nearly wheel-shaped (white), much shorter than the calyx. ① (O. uniflora, *L.* Hedyotis glomerata, *Ell.*) — Wet places, S. New York to Virginia near the coast, and southward.

§ 2. HOUSTÒNIA, L. *Corolla salver-form or funnel-form, with the tube longer than the calyx-lobes: anthers linear: upper half or the summit of the pod free and projecting beyond the tube of the calyx: the teeth of the latter distant: seeds rather few* (4–20) *in each cell, saucer-shaped, with a ridge down the middle of the hollowed inner face.* (*Flowers of two forms, diœciously dimorphous*; p. 171, note.)

* *Corolla funnel-form, often hairy inside: stems erect: stem-leaves sessile: flowers mostly in terminal small cymes or loose clusters, purplish.* (Connects Houstonia and Oldenlandia.)

2. **O. purpùrea.** Pubescent or smooth (8′–15′ high); *leaves varying from roundish-ovate to lanceolate*, 3–5-ribbed; calyx-lobes longer than the *half free globular pod.* ♃ (Houstonia purpurea, *L.* H. varians, *Michx.*) — Woodlands, W. Penn. to Illinois and southward. May – July. — Varying wonderfully, into: —

Var. **longifòlia.** Leaves varying from oblong-lanceolate to linear, narrowed at the base, 1-ribbed; calyx-lobes scarcely as long as the pod: stems 5′–12′ high. (Houstonia longifolia, *Willd.*) — Maine to Wisconsin and southward. — A narrow-leaved, slender form is H. tenuifolia, *Nutt.*

Var. **ciliolàta.** More tufted stems 3′–6′ high; root-leaves in rosettes, thickish and ciliate; calyx-lobes as long as the pod. (Houstonia ciliolata, *Torr.*) — Along the Great Lakes and rivers, from N. New York to Wisconsin.

3. **O. angustifòlia,** Gray. Stems tufted from a hard or woody root (6′–20′ high); *leaves narrowly linear*, acute, 1-ribbed, many of them fascicled; flowers crowded, short-pedicelled; lobes of the corolla densely bearded inside; *pod obovoid and acute at the base, only its summit free* from the calyx, opening first across the top, at length splitting through the partition. ♃ (Houstonia angustifolia, *Michx.* Hedyòtis stenophylla, *Torr. & Gray.*) — Plains and banks, from Illinois southward. June – Aug.

* * *Corolla salver-form, mostly blue: pod flattish laterally and notched at the broad summit, or somewhat twin: plants commonly small and slender.*

4. **O. minima.** Glabrous, at length branched and spreading (½′–3′ high); *peduncles not longer than the linear-spatulate leaves; pod barely ½ free;* seeds smoothish. ① ② (Houstonia minima, *Beck.*) — River-banks, Illinois and southward. March – May.

5. **O. cærùlea.** (BLUETS.) Glabrous; stems erect, slender, sparingly branched (3′–5′ high); leaves oblong-spatulate (3″–4″ long); *peduncles filiform*, 1′–2½′ *long; pod free to the middle;* seeds rough-dotted. ② (Houstonia cærulea, *L.* Hedyotis, *Hook.*) — Moist and grassy places; common. May–Aug. — A delicate little herb, producing in spring a profusion of light-blue flowers fading to white, with a yellowish eye.

O. SERPYLLIFÒLIA (Houstonia serpyllifolia, *Michx.*) may probably be found in the high mountains of Virginia; and O. ROTUNDIFÒLIA in the southeastern part of the same State.

SUBORDER III. LOGANIÈÆ. THE LOGANIA FAMILY.

7. MITRÈOLA, L. MITRE-WORT.

Calyx 5-parted. Corolla little longer than the calyx, somewhat funnel-form, 5-lobed, valvate in the bud. Stamens 5, included. Ovary free from the calyx, except at the base, 2-celled: styles 2, short, converging and united above; the stigmas also united. Pod projecting beyond the calyx, strongly 2-horned or mitre-shaped, opening down the inner side of each horn, many-seeded. — Annual smooth herbs, with opposite leaves, small stipules between the leaves, and small white flowers spiked along one side of the branches of a terminal petioled cyme. (Name, *a little mitre*, from the shape of the pod.)

1. **M. petiolàta,** Torr. & Gray. Leaves thin, oblong-lanceolate, petioled. — Damp soil, from Eastern Virginia southward. — Plant 1°–2° high.

8. SPIGÈLIA, L. PINK-ROOT. WORM-GRASS.

Calyx 5-parted, persistent; the lobes slender. Corolla tubular-funnel-form, 5-lobed at the summit, valvate in the bud. Stamens 5: anthers linear. Style slender, hairy above, jointed near the middle. Pod short, twin, laterally flattened, separating at maturity from the base into 2 carpels, which open loculicidally, few-seeded. — Chiefly herbs, with the opposite leaves united by means of the stipules, and the flowers spiked in one-sided cymes. (Named for *Prof. Spigelius*, who wrote on botany at the beginning of the 17th century.)

1. **S. Marilándica,** L. Stems upright, simple (6′–15′ high); leaves sessile, ovate-lanceolate, acute; spike 3–8-flowered; tube of the corolla 4 times the length of the calyx, the lobes lanceolate; anthers and style exserted. ♃ — Rich woods, Pennsylvania to Wisconsin and southward. June, July. — Corolla 1½′ long, crimson outside, yellowish within. — A well-known officinal anthelmintic, and a showy plant.

ORDER 57. VALERIANÀCEÆ. (VALERIAN FAMILY.)

Herbs, with opposite leaves and no stipules; the calyx-tube coherent with the ovary, which has one fertile 1-*ovuled cell and two abortive or empty ones; the stamens distinct,* 2–3, *fewer than the lobes of the corolla, and inserted on its tube.* — Corolla tubular or funnel-form, often irregular, mostly 5-

lobed, the lobes imbricated in the bud. Style slender: stigmas 1–3 Fruit indehiscent, 1-celled (the two empty cells of the ovary disappearing), or 3-celled, two of them empty, the other 1-seeded. Seed suspended, anatropous, with a large embryo and no albumen. — Flowers in panicled or clustered cymes. (Roots often odorous and antispasmodic.) — Represented by only two genera.

1. VALERIÀNA, Tourn. VALERIAN.

Limb of the calyx of several plumose bristles (like a pappus) which are rolled up inwards in flower, but unroll and spread as the seed-like 1-celled fruit matures. Corolla commonly gibbous at or above the base, the 5-lobed limb nearly regular. Stamens 3. — Perennial herbs, with thickened strong-scented roots, and simple or pinnate leaves. Flowers in many species imperfectly diœcious, or dimorphous. (Name from *valere*, to have efficacy, alluding to the medicinal qualities.)

* *Root fibrous: leaves thin.* (*Stems* 1°–3° *high.*)

1. **V. pauciflòra,** Michx. Smooth, slender; *root-leaves ovate, heart-shaped, toothed,* pointed, sometimes with 2 small lateral divisions; stem-leaves pinnate, with 3–7 ovate toothed leaflets; branches of the panicled cyme few-flowered; tube of the (pale pink) *corolla long and slender* (½′ long). — Woodlands, Ohio and W. Virginia, Kentucky, &c. June.

2. **V. sylvática,** Richards. Smooth or minutely pubescent; *root-leaves ovate or oblong, entire,* rarely with 2 small lobes; stem-leaves pinnate, with 5–11 oblong-ovate or lanceolate nearly entire leaflets; cyme at first close, many-flowered; *corolla inversely conical* (3″ long, rose-color). — Cedar swamps, W. Vermont and New York to Michigan, and northward. June.

* *Root spindle-shaped, large and deep* (6′–12′ *long*): *leaves thickish.*

3. **V. édulis,** Nutt. Smooth, or minutely downy when very young; stem straight (1°–4° high), few-leaved; leaves commonly minutely and densely ciliate, those of the root mostly spatulate and lanceolate, of the stem pinnately parted into 3–7 long and narrow divisions; flowers in a long and narrow interrupted panicle, nearly diœcious; corolla whitish, obconical (2″ long). (V. ciliàta, *Torr. & Gr.*) — Alluvial ground, Ohio to Wisconsin, and westward. June. — Root with the strong smell and taste of Valerian: it is cooked and eaten by the Oregon Indians.

2. FÈDIA, Gærtn. CORN SALAD. LAMB-LETTUCE.

Limb of the calyx obsolete or merely toothed. Corolla funnel-form, equally or unequally 5-lobed. Stamens 3, rarely 2. Fruit 3-celled, two of the cells empty and sometimes confluent into one, the other 1-seeded. — Annuals and biennials, usually smooth, with forking stems, tender and rather succulent leaves (entire or cut-lobed towards the base), and white or whitish cymose-clustered and bracted small flowers. (Name of uncertain derivation.) — Our species all have the limb of the calyx obsolete, and are so much alike in aspect, flowers, &c., that good characters are only to be taken from the fruit. They all have a rather short tube to the corolla, the limb of which is nearly regular, and therefore belong to the section (by many botanists taken as a genus) VALERIANÉLLA.

1. **F. OLITÒRIA**, Vahl. *Fruit compressed,* oblique, at length broader than long, with *a corky or spongy mass at the back of the fertile cell nearly as large as the* (often confluent) *empty cells;* flowers bluish. — Fields, Penn. to Virginia: rare. (Adv. from Eu.)

2. **F. Fagopȳrum,** Torr. & Gr. *Fruit ovate-triangular, smooth, not grooved between the* (at length confluent) *empty cells, which form the anterior angle, and are much smaller than the broad and flat fertile one;* flowers white. — Low grounds, from Western New York to Wisconsin and Kentucky. May, June. — Plant 1°–2° high.

3. **F. radiàta,** Michx. *Fruit ovoid, downy* (rarely smooth), *obtusely* and unequally somewhat 4-*angled; the empty cells parallel and contiguous,* but with a deep groove between them, *rather narrower than the flattish fertile cell.* — Low grounds, Penn. to Michigan, and southward. — Plant 6′–15′ high.

4. **F. umbilicàta,** Sulliv. *Fruit globular-ovate, smooth; the much inflated sterile cells wider and many times thicker than the flattish fertile one,* contiguous, and when young with a common partition, *when grown, indented with a deep circular depression* in the middle, opening into the confluent sterile cells; bracts not ciliate. — Moist grounds, Columbus, Ohio, *Sullivant.* (*Sill. Jour.*, Jan. 1842.)

5. **F. patellària,** Sulliv. *Fruit smooth, circular, platter-shaped* or disk-like, slightly notched at both ends, *the flattened-concave sterile cells widely divergent,* much broader than the fertile one, and forming a kind of wing around it when ripe. — Low grounds, Columbus, Ohio, *Sullivant.* — Plant 1°–2° high, resembling the last, but with a very different fruit.

ORDER 58. DIPSÀCEÆ. (TEASEL FAMILY.)

Herbs, with opposite or whorled leaves, no stipules, and the flowers in dense heads, surrounded by an involucre, as in the Composite Family; *but the stamens are distinct, and the suspended seed has albumen.* — Represented by the Scabious (cultivated) and the genus

1. DÍPSACUS, Tourn. TEASEL.

Involucre many-leaved, longer than the chaffy leafy-tipped and pointed bracts among the densely capitate flowers: each flower with a 4-leaved calyx-like involucel investing the ovary and fruit (achenium). Calyx-tube coherent with the ovary, the limb cup-shaped, without a pappus. Corolla nearly regular, 4-cleft. Stamens 4, inserted on the corolla. Style slender. — Stout and coarse biennials, hairy or prickly, with large oblong heads. (Name from διψάω, *to thirst,* probably because the united cup-shaped bases of the leaves in some species hold water.)

1. **D. SYLVÉSTRIS**, Mill. (WILD TEASEL.) Prickly; leaves lance-oblong; leaves of the involucre slender, longer than the head; bracts (chaff) tapering

into a long flexible awn with a straight point. — Road-sides: rather rare. (Nat. from Eu.) Suspected to be the original of

D. FULLÓNUM, the cultivated FULLER'S TEASEL, which has a shorter involucre, and stiff chaff to the heads, with hooked points, — used for raising a nap upon woollen cloth.

ORDER 59. COMPÓSITÆ. (COMPOSITE FAMILY.)

Flowers in a close head (the compound flower of the older botanists), *upon a common receptacle, surrounded by an involucre, with* 5 (*rarely* 4) *stamens inserted on the corolla, their anthers united in a tube* (*syngenesious*). — Calyx-tube united with the 1-celled ovary, the limb (called a *pappus*) crowning its summit in the form of bristles, awns, scales, teeth, &c., or cup-shaped, or else entirely absent. Corolla either strap-shaped or tubular; in the latter chiefly 5-lobed, valvate in the bud, the veins bordering the margins of the lobes. Style 2-cleft at the apex. Fruit seed-like (*achenium*), dry, containing a single erect anatropous seed, with no albumen. — An immense family, chiefly herbs in temperate regions, without stipules, with perfect, polygamous, monœcious or diœcious flowers. The flowers with a strap-shaped (*ligulate*) corolla are called *rays* or *ray-flowers*: the head which presents such flowers, either throughout or at the margin, is *radiate*. The tubular flowers compose the *disk*; and a head which has no ray-flowers is said to be *discoid*. The leaves of the involucre, of whatever form or texture, are termed *scales*. The bracts or scales, which often grow on the receptacle among the flowers, are called the *chaff*: when these are wanting, the receptacle is *naked*. — The largest order of Phænogamous plants, divided by the corolla into three suborders, only two of which are represented in the Northern United States.

SUBORDER I. TUBULIFLORÆ.

Corolla tubular in all the perfect flowers, regularly 5- (rarely 3 – 4-) lobed, ligulate only in the marginal or ray-flowers, which when present are either pistillate only, or neutral (with neither stamens nor pistil).

The technical characters of the five tribes of the vast suborder *Tubulifloræ*, taken from the styles, require a magnifying-glass to make them out. and will not always be clear to the student. The following artificial analysis, founded upon other and more obvious distinctions, will be useful to the beginner. (The numbers are those of the genera.)

Artificial Key to the Genera of this Suborder.

§ 1. Rays or ligulate flowers none: corollas all tubular.

* Flowers of the head all perfect and alike.

+– Pappus composed of bristles.

Pappus double; the outer composed of very short, the inner of longer bristles. . No. 1.
Pappus simple; the bristles all of the same sort.

Heads few-flowered, themselves aggregated into a compound or dense cluster. . No. 2.

Heads separate, few-flowered or many-flowered.

Receptacle (when the flowers are pulled off) bristly hairy. . . . . . 67, 68, 70.

Receptacle deeply honeycomb-like. . . . . 69.

Receptacle naked.

Pappus of plumose or bearded stiff bristles. Flowers purple. . . . . . 4.

Pappus of very plumose bristles. Flowers whitish. . . . . 5.

Pappus of slender but rather stiff rough bristles. . . . . . . 6, 7, 8, 20.

Pappus of very soft and weak naked bristles. . . . . 62, 63.

+ + Pappus composed of scales or chaff.

Receptacle naked. Leaves in whorls. . . . . 3.

Receptacle naked. Leaves alternate. . . . . 45.

Receptacle bearing chaff among the flowers. . . . . 49.

+ + + Pappus of 2 or few barbed awns or teeth. . . . 41, 42.

+ + + + Pappus none, or a mere crown-like margin to the fruit. . . 55

* * Flowers of two kinds in the same head.

Marginal flowers neutral and sterile, either conspicuous or inconspicuous. . . 65, 66.

Marginal flowers pistillate and fertile.

Receptacle elongated and bearing broad chaff among the flowers. . . . . 60.

Receptacle naked or bearing no conspicuous chaff.

Pappus of capillary bristles. Involucre imbricated. . . . . 23, 58, 59.

Pappus of capillary bristles. Involucre merely one row of scales. . . . 14, 61.

Pappus obsolete or none.

Achenia becoming much longer than the involucre. . . . . 11.

Achenia not exceeding the involucre. . . . . 29, 56, 57.

* * * Flowers of two kinds in separate heads; one pistillate, the other staminate.

Heads diœcious; both kinds many-flowered. Pappus capillary. . . . . . 24, 59.

Heads monœcious; the fertile 1-2-flowered and closed. Pappus none. . . . 30, 31.

§ 2. Rays present; i. e. the marginal flowers or some of them with ligulate corollas.

* Pappus of capillary bristles. (Rays all pistillate.)

Rays occupying several rows, ... 9, 10, 14.

Rays in one marginal row, and

White, purple or blue, never yellow. . . . . 12-15.

Yellow, of the same color as the disk.

Pappus double, the outer short and minute. . . . . 21.

Pappus simple.

Scales of the involucre equal and all in one row. Leaves alternate. . . 63.

Scales of the involucre in 2 rows. Leaves opposite. . . . . . . 64.

Scales of the involucre imbricated. Leaves alternate. . . . . . . 19, 22.

* * Pappus a circle of chaffy scales, dissected into bristles. . . . 44.

* * * Pappus a circle of thin chaffy scales or short chaffy bristles.

Heads several-flowered. Receptacle chaffy. . . . . 50.

Heads 8-10-flowered. Receptacle naked. . . . . 13.

Heads many-flowered. Receptacle deeply honeycombed. 48

Heads many-flowered. Receptacle naked. . . . . 46, 47.

* * * Pappus none, or a cup or crown, or of 2 or 3 awns, teeth, or chaffy scales corresponding with the edges or angles of the achenium, often with intervening minute bristles or scales.

+ Receptacle naked.

Achenia flat, wing-margined. Pappus of separate little bristles or awns. . . . 16.

Achenia flat, marginless. Pappus none. Receptacle conical. . . . . . . 17.

Achenia terete or angled. Pappus none. Receptacle flattish. . . . . . . 54.

Achenia angled. Pappus a little cup or crown. Receptacle conical. . 55.

+– +– Receptacle chaffy.

Rays neutral (rarely pistillate but sterile); the disk-flowers perfect and fertile.
  Receptacle elevated (varying from strongly convex to columnar), and
    Chaffy only at the summit; the chaff deciduous. Pappus none. . . . No. 51.
    Chaffy throughout. Achenia flattened laterally if at all. . . . . 36–40.
  Receptacle flat. Achenia flattened parallel with the scales or chaff. . . . 41, 42.
Rays pistillate and fertile; the disk-flowers also perfect and fertile.
  Achenia much flattened laterally, 1–2-awned. . . . . 43.
  Achenia flattened parallel with the scales and chaff. Pappus none. . . . . 53.
  Achenia 3–4-angular, terete or laterally flattish, awnless.
    Receptacle convex or conical. Leaves alternate, dissected. . . . . . 52.
    Receptacle conical. Leaves opposite, simple.
      Achenia obovoid. Involucre a leafy cup. . . . . 32.
      Achenia 4-angular. Involucre of separate scales. . . . . . . 35.
    Receptacle flat. Leaves opposite and simple. . . . . 33, 34.
Rays pistillate and fertile: the disk-flowers staminate and sterile (pistil imperfect).
    Receptacle chaffy. . . . . 25–28.

Systematic Synopsis.

TRIBE I. **VERNONIACEÆ.** Heads discoid; the flowers all alike, perfect and tubular. Branches of the style long and slender, terete, thread-shaped, minutely bristly-hairy all over. — Leaves alternate or scattered.

1. VERNONIA. Heads several-many-flowered, separate. Involucre of many scales. Pappus of many capillary bristles.
2. ELEPHANTOPUS. Heads 3–5-flowered, crowded into a compound head. Involucre of 8 scales. Pappus of several chaffy bristles.

TRIBE II. **EUPATORIACEÆ.** Heads discoid, the flowers all alike, perfect and tubular; or in a few cases dissimilar, and the outer ones ligulate. Branches of the style thickened upwards or club-shaped, obtuse, flattish, uniformly minutely pubescent; the stigmatic lines indistinct.

Subtribe 1. EUPATORIEÆ. Flowers all perfect and tubular, never truly yellow.

* Pappus a row of hard scales.

3. SCLEROLEPIS. Head many-flowered. Scales of the involucre equal. Leaves whorled.

* * Pappus of slender bristles.

4. LIATRIS. Achenia many-ribbed. Bristles of the pappus plumose or barbellate. Corollas red-purple, 5-lobed.
5. KUHNIA. Achenia many-ribbed. Bristles of the pappus very strongly plumose. Corollas whitish, 5-toothed.
6. EUPATORIUM. Achenia 5-angled. Bristles of the pappus roughish. Scales of the involucre many or several. Receptacle of the flowers flat.
7. MIKANIA Achenia and pappus as No. 6. Scales of the involucre and flowers only 4.
8. CONOCLINIUM. Achenia, pappus, &c. as No. 6. Receptacle conical.

Subtribe 2. TUSSILAGINEÆ. Flowers (sometimes yellow) more or less monœcious or diœcious, at least of 2 sorts in the same head.

* Outer flowers of each (many-flowered) head pistillate and ligulate. Scape leafless.

9. NARDOSMIA. Heads corymbed. Flowers somewhat diœcious. Pappus capillary.
10. TUSSILAGO. Head single; the outer pistillate flowers in many rows. Pappus capillary.

* * Flowers all tubular. Stem leafy.

11. ADENOCAULON. Head few-flowered; the outer flowers pistillate. Pappus none.

TRIBE III. **ASTEROIDEÆ.** Heads discoid, with the flowers all alike and tubular; or radiate, the outer ones ligulate and pistillate. Branches of the style in the perfect flowers flat, smooth up to where the conspicuous marginal stigmatic lines abruptly terminate, and prolonged above this into a flattened lance-shaped or triangular appendage which is evenly hairy or pubescent outside. — Leaves alternate. Receptacle naked (destitute of chaff) in all our species.

Subtribe 1. Asterineæ. Flowers of the head all alike and perfect, or the marginal ones ligulate and pistillate. Anthers without tails at the base.

* Ray-flowers white, blue, or purple, never yellow.

← Pappus of numerous long and capillary bristles: receptacle flat.

12. SERICOCARPUS. Heads 12-15-flowered: rays 4 or 5. Involucre oblong or club-shaped, imbricated, cartilaginous. Achenia short, narrowed downwards, silky.

13. ASTER. Heads many-flowered. Involucre loosely or closely imbricated. Achenia flattish. Pappus simple.

14. ERIGERON. Heads many-flowered. Involucre of nearly equal narrow scales, almost in one row. Achenia flattened. Pappus simple, or with an outer set of minute scales.

15. DIPLOPAPPUS. Heads many-flowered. Involucre imbricated. Pappus double; the outer obscure, of minute stiff bristles.

← ← Pappus of very short rigid bristles, or none: receptacle conical or hemispherical.

16. BOLTONIA. Achenia flat and wing-margined. Pappus very short.

17. BELLIS. Achenia marginless. Pappus none. Receptacle conical.

* * Ray-flowers yellow (in one species of Solidago whitish), or sometimes none at all.

18. BRACHYCHÆTA. Heads 8-10-flowered, clustered: rays 4 or 5. Pappus a row of minute bristles shorter than the achenium.

19. SOLIDAGO. Heads few-many-flowered: rays 1-16. Pappus simple, of numerous slender and equal capillary bristles.

20. BIGELOVIA. Heads 3-4-flowered: rays none. Receptacle awl-shaped. Pappus simple, a single row of capillary bristles.

21. CHRYSOPSIS. Heads many-flowered: rays numerous. Pappus double; the outer of very small chaffy bristles, much shorter than the inner of capillary bristles.

Subtribe 2. Inuleæ. Anthers with tails at their base: otherwise as Subtribe 1.

22. INULA. Heads many-flowered. Rays many. Pappus capillary.

Subtribe 3. Baccharideæ & Tarchonantheæ. Flowers of the head all tubular, either diœcious or monœcious, namely, the staminate and pistillate flowers either in different heads on distinct plants, or in the same head. Corolla of the pistillate fertile flowers a very slender tube sheathing the style, and truncate at the summit.

23. PLUCHEA. Heads containing a few perfect but sterile flowers in the centre, and many pistillate fertile ones around them. Anthers tailed at the base. Pappus capillary.

24. BACCHARIS. Heads diœcious, some all pistillate, others all staminate, on different plants. Anthers tailless. Pappus capillary.

Tribe IV. **SENECIONIDEÆ.** Heads various. Branches of the style in the fertile flowers linear, thickish or convex externally, flat internally, hairy or pencil-tufted at the apex (where the stigmatic lines terminate abruptly), and either truncate, or continued beyond into a bristly-hairy appendage. — Leaves either opposite or alternate.

Subtribe 1. Melampodineæ. Flowers none of them perfect, but either staminate or pistillate; the two sorts either in the same or in different heads. Anthers tailless. Pappus, if any, never of bristles.

* Heads containing two kinds of flowers, radiate; the ray-flowers pistillate, the central and tubular staminate flowers having a pistil, but always sterile. Receptacle chaffy.

25. POLYMNIA. Achenia thick and turgid, roundish. Pappus none.

26. CHRYSOGONUM. Achenia flattened. Pappus a one-sided 2-3-toothed chaffy crown.

27. SILPHIUM. Achenia very flat, wing-margined, numerous in several rows: rays deciduous.

28. PARTHENIUM. Achenia flat, slightly margined, bearing a pappus of 2 chaffy scales and the very short persistent ray-corolla.

* * Heads with two kinds of flowers, discoid; pistillate flowers with a small tubular corolla.

29 IVA. Pistillate flowers 1-5 in the margin. Achenia thickish. Pappus none.

* * * Heads of two sorts, one containing staminate, the other pistillate flowers, both borne on the same plant; the pistillate only 1-2, in a closed involucre resembling an achenium or a bur; the staminate several, in an open cup-shaped involucre.

30. AMBROSIA. Fertile involucre (fruit) small, 1-flowered, pointed and often tubercled.

31. XANTHIUM. Fertile involucre (fruit) an oblong prickly bur, 2-celled, 2-flowered.

Subtribe 2. HELIANTHEÆ. Heads radiate, or rarely discoid; the rays ligulate, the disk-flowers all perfect and fertile. Receptacle chaffy. Anthers blackish, tailless. Pappus none, or a crown or cup, or of one or two chaffy awns, never capillary, nor of several uniform chaffy scales. — Leaves more commonly opposite.

* Rays pistillate and fertile: achenia 3-4-sided, slightly if at all flattened.

+– Involucre double; the outer forming a cup.

32. TETRAGONOTHECA. Outer involucre 4-leaved. Achenia obovoid. Pappus none.

+– +– Involucre of one or more rows of separate scales.

33. ECLIPTA. Receptacle flat; its chaff bristle-shaped. Pappus obsolete or none.

34. BORRICHIA. Receptacle flat, its chaff scale-like and rigid. Pappus an obscure crown.

35. HELIOPSIS. Receptacle conical; its chaff linear. Pappus none or a mere border.

* * Rays sterile (either entirely neutral or with an imperfect style), or occasionally none; achenia 4-angular or flattened laterally, i. e. their edges directed inwards and outwards, the chaff of the receptacle embracing their outer edge.

+– Receptacle elevated, conical or columnar. Pappus none or a short crown.

36. ECHINACEA. Rays (very long) pistillate, but sterile. Achenia short, 4-sided.

37. RUDBECKIA. Rays neutral. Achenia 4-sided, flat at the top, marginless.

38. LEPACHYS. Rays few, neutral. Achenia flattened laterally and margined.

+– +– Receptacle flattish or conical. Pappus chaffy or awned.

39. HELIANTHUS. Rays neutral. Achenia flattened, marginless. Pappus of 2 very deciduous chaffy scales.

40. ACTINOMERIS. Rays neutral, or sometimes none. Achenia flat, wing-margined, bearing 2 persistent awns.

* * * Rays sterile, neutral: achenia obcompressed, i. e flattened parallel with the scales of the involucre, the faces looking inwards and outwards. Involucre double; the outer spreading and often foliaceous. Receptacle flat.

41. COREOPSIS. Pappus of 2 (or rarely more) scales, teeth, or awns, which are naked or barbed upwards, sometimes obsolete or a crown.

42. BIDENS. Pappus of 2 or more rigid and persistent downwardly barbed awns.

* * * * Rays pistillate or fertile (rarely none): achenia laterally flattened, 2-awned.

43. VERBESINA. Rays few and small. Receptacle convex. Achenia sometimes winged.

Subtribe 3. TAGETINEÆ. Heads commonly radiate; the rays ligulate; the disk-flowers all perfect and fertile. Receptacle naked, flat. Scales of the involucre united into a cup. Pappus various — Herbage strong-scented (as in Tagetes of the gardens), being dotted with large pellucid glands containing a volatile oil.

44 DYSODIA. Pappus a row of chaffy scales dissected into many bristles

Subtribe 4. HELENIEÆ. Heads radiate or sometimes discoid; the disk-flowers perfect. Pappus of several chaffy scales. Anthers tailless.

* Receptacle naked (not chaffy nor honeycombed).

45. HYMENOPAPPUS. Rays none. Receptacle flat. Scales of the involucre colored.

46. HELENIUM. Rays pistillate, 3-5-cleft. Receptacle elevated. Involucre small, reflexed.

47. LEPTOPODA. Rays neutral or sterile: otherwise as No 46.

* * Receptacle deeply pitted, like honeycomb.

48. BALDWINIA. Rays numerous, neutral. Involucre imbricated.

* * * Receptacle chaffy.

49. MARSHALLIA. Rays none. Involucre of many narrow chaffy scales.

50. GALINSOGA. Rays 4 or 5, short, pistillate. Involucre of 4 or 5 ovate chaffy scales.

Subtribe 5. ANTHEMIDEÆ. Heads radiate or discoid; the perfect flowers sometimes infertile, and the pistillate flowers rarely tubular. Pappus a short crown or none. Otherwise nearly as Subtribe 4.

* Receptacle chaffy, at least in part: rays ligulate

51. MARUTA. Rays neutral. Achenia obovoid, ribbed. Pappus none.

52. ANTHEMIS. Rays pistillate. Achenia terete or 4-angular. Pappus minute or none.

53. ACHILLEA. Rays pistillate, short. Achenia flattened and margined.

* * Receptacle naked.

54. LEUCANTHEMUM. Rays numerous, pistillate. Receptacle flattish. Achenia striate or ribbed. Pappus none.

55. MATRICARIA. Rays pistillate or none; then all the flowers perfect. Receptacle conical. Pappus crown-like or none.

56. TANACETUM. Rays none, but the marginal flowers pistillate. Achenia broad at the top. Pappus a short crown.

57. ARTEMISIA. Rays none; some of the outer flowers often pistillate. Achenia narrow at the top. Pappus none.

Subtribe 6. GNAPHALINEÆ. Heads all discoid, with tubular corollas; those of the fertile flowers filiform. Anthers with tails at their base. Pappus of capillary bristles. Flocculent-woolly herbs: leaves alternate.

58. GNAPHALIUM. Receptacle naked, flat. Heads containing both perfect and pistillate flowers Bristles of the pappus all slender.

59. ANTENNARIA. Receptacle naked, flat. Heads diœcious, or nearly so. Pappus of the staminate flowers thickened or club-shaped at the summit.

60. FILAGO. Receptacle columnar or top-shaped, chaffy. Pappus of the inner flowers capillary, of the outer often none.

Subtribe 7. SENECIONEÆ. Heads radiate or discoid; the central flowers perfect. Anthers tailless. Pappus capillary. Receptacle naked. (Scales of the involucre commonly in a single row.)

* Heads discoid, with two kinds of flowers, the outer pistillate and with filiform corollas.

61. ERECHTHITES. Pappus copious, very fine and soft. Flowers whitish.

* * Heads radiate, or discoid and then with perfect flowers only.

+ Leaves alternate.

62. CACALIA. Heads 5-many-flowered. Rays none. Flowers white or cream-color.

63. SENECIO. Heads many-flowered, with or without rays. Flowers yellow. Pappus soft.

+ + Leaves opposite.

64. ARNICA. Heads many-flowered, radiate. Pappus of rough denticulate bristles.

TRIBE V. CYNAREÆ. Heads (in our species) discoid, with the flowers tubular, or some of the outer corollas enlarged and appearing like rays, but not ligulate. Style thickened or thickish near the summit; the branches stigmatic to the apex, without any appendage, often united below. (Heads large.)

* Marginal flowers mostly neutral or sterile. Pappus not plumose.

65. CENTAUREA. Achenia flat. Pappus of short naked bristles, or none. Marginal neutral flowers commonly enlarged.

66. CNICUS. Achenia terete, bearing 10 horny teeth and a pappus of 10 long and 10 shorter rigid naked bristles. Marginal flowers inconspicuous.

* * Flowers all alike in the ovoid or globular head.

67. CIRSIUM. Achenia smooth. Pappus of plumose bristles. Receptacle clothed with long and soft bristles.

68. CARDUUS. Pappus of naked bristles: otherwise as No. 67.

69. ONOPORDON. Achenia wrinkled transversely, 4-angled. Pappus not plumose. Receptacle honeycombed.

70. LAPPA. Achenia wrinkled, flattened. Pappus of short and rough bristles. Receptacle bristly.

SUBORDER II. LIGULIFLORÆ.

Corolla ligulate in all the flowers of the head, and all the flowers perfect. — Herbs with milky juice. Leaves alternate.

* Pappus none.

71. LAMPSANA. Involucre cylindrical, of 8 scales in a single row, 8-12-flowered.

* * Pappus chaffy, or of both chaff and bristles.

72. CICHORIUM. Pappus a small crown of little bristle-form scales. Involucre double.

73. KRIGIA. Pappus of 5 broad chaffy scales, and 5 bristles.

74. CYNTHIA. Pappus double; the outer short, of many minute chaffy scales, the inner of numerous long capillary bristles.

* * * Pappus plumose.

75. LEONTODON. Bristles of the pappus several, chaffy-dilated at the base.

* * * * Pappus composed entirely of capillary bristles, not plumose.

+ Pappus tawny or dirty white: achenia not flattened or beaked.

76. HIERACIUM. Achenia oblong: pappus a single series. Flowers yellow. Scales of the involucre unequal.

77. NABALUS. Achenia cylindrical: pappus copious. Flowers whitish or purplish. Scales of the involucre equal.

+ + Pappus bright white, except in No. 80 and in one Mulgedium.

78. TROXIMON. Achenia linear-oblong, not beaked. Pappus of copious and unequal bristles, some of them rigid.

79. TARAXACUM. Achenia long-beaked, terete, ribbed. Pappus soft and white.

80. PYRRHOPAPPUS. Achenia long-beaked, nearly terete. Pappus soft, reddish or tawny.

81. LACTUCA. Achenia abruptly long-beaked, flat. Pappus soft and white.

82. MULGEDIUM. Achenia flattish, with a short thick beak. Pappus soft. Flowers blue.

83. SONCHUS. Achenia flattish, beakless. Pappus very soft and fine. Flowers yellow.

1. VERNÒNIA, Schreb. IRON-WEED.

Heads 15-many-flowered, in corymbose cymes; flowers all perfect. Involucre shorter than the flowers, of many appressed closely imbricated scales. Receptacle naked. Achenia cylindrical, ribbed. Pappus double; the outer of minute scale-like bristles; the inner of copious capillary bristles. — Perennial herbs, with alternate leaves and mostly purple flowers. (Named in honor of *Mr. Vernon*, an early English botanist who travelled in this country.)

1. **V. Noveboracénsis,** Willd. *Scales of the involucre tipped with a long bristle-form or awl-shaped spreading appendage or awn;* in some varieties merely pointed. — Low grounds near the coast, Maine to Virginia; and river-banks in the Western States, from Wisconsin southward. Aug. — A tall coarse weed with lanceolate or oblong leaves.

2. **V. fasciculàta,** Michx. *Scales of the involucre* (all but the lowest) *rounded and obtuse, without appendage.* — Prairies and river-banks, Ohio to Wisconsin and southward. Aug. — Leaves narrowly or broadly lanceolate: heads mostly crowded. Very variable, and passing into No. 1.

2. ELEPHÁNTOPUS, L. ELEPHANT'S-FOOT.

Heads 3 – 5-flowered, clustered into a compound head: flowers perfect. **Involucre** narrow, flattened, of 8 oblong dry scales. Achenia many-ribbed. **Pappus** of stout bristles, chaffy-dilated at the base. — Perennials, with alternate leaves and purplish flowers. (Name composed of ἐλέφας, *elephant*, and πούς, *foot*.)

1. **E. Caroliniànus,** Willd. Somewhat hairy, corymbose, leafy; leaves ovate-oblong, thin. — Dry soil, Pennsylvania and southward.

3. SCLERÓLEPIS, Cass. SCLEROLEPIS.

Head many-flowered: flowers perfect. Scales of the involucre linear, equal, in 1 – 2 rows. Corolla 5-toothed. Achenia 5-angled. Pappus a single row of almost horny oval and obtuse scales. — A smooth aquatic perennial, with simple stems, rooting at the base, bearing linear entire leaves in whorls of 5 or 6, and terminated by a head of flesh-colored flowers. (Name from σκληρός, *hard*, and λεπίς, *a scale*, alluding to the pappus.)

1. **S. verticillàta,** Cass. — Pine barrens, New Jersey and southward. Aug.

4. LIÀTRIS, Schreb. BUTTON SNAKEROOT. BLAZING-STAR.

Head several – many-flowered: flowers perfect. Scales of the involucre imbricated, appressed. Receptacle naked. Corolla 5-lobed. Achenia slender, tapering to the base, about 10-ribbed. Pappus of 15 – 40 capillary bristles, which are manifestly plumose, or only barbellate. — Perennial herbs, often resinous-dotted, with rigid alternate entire leaves, and heads of handsome rose-purple flowers, spicate, racemose, or panicled-cymose, appearing late in summer or in autumn. (Derivation of the name unknown.)

§ 1. *Stem usually wand-like and simple, from a globular or roundish corm or tuber (which is impregnated with resinous matter), very leafy: leaves narrow or grass-like, 1 – 5-nerved: heads spicate or racemed: involucre well imbricated: lobes of the corolla long and slender.*

* *Pappus very plumose; scales of the 5-flowered involucre with ovate or lanceolate spreading petal-like (purple or sometimes white) tips, exceeding the flowers.*

1. **L. élegans,** Willd. Stem (3° – 5° high) and involucre hairy; leaves short and spreading; spike or raceme compact (1° long). — Barren soil, Virginia and southward.

* * *Pappus very plumose: scales of the cylindrical many-flowered involucre imbricated in many rows, the tips rigid, not petal-like: corolla hairy within.*

2. **L. squarròsa,** Willd. (BLAZING-STAR, &c.) Often hairy (1° – 3° high); leaves linear, elongated; heads few (1′ long); *scales of the involucre mostly with elongated and leaf-like spreading tips.* — Dry soil, Pennsylvania to Illinois and southward.

3. **L. cylindràcea,** Michx. Commonly smooth (6′ – 18′ high); leaves linear; *heads* few (½′ – ⅔′ long); *scales of the involucre all with short and rounded appressed tips.* — Dry open places, Niagara Falls to Wisconsin, and southwestward.

* * * *Pappus not plumose to the naked eye: corolla smooth inside.*

4. **L. scariòsa,** Willd. Stem stout (2° – 5° high), pubescent or hoary; *leaves* (smooth, rough, or pubescent) *lanceolate; the* lowest *oblong-lanceolate or obovate-oblong,* tapering into a petiole; heads few or many, large, 30 – 40-flowered; *scales of the broad or depressed involucre obovate or spatulate, very numerous, with dry and scarious often colored tips or margins.* — Dry sandy soil, New England to Wisconsin, and southward. — A widely variable species: heads 1' or less in diameter.

5. **L. pilòsa,** Willd. Beset with long scattered hairs; stem stout; *leaves linear or linear-lanceolate,* elongated; heads few, 10 – 15-flowered; *scales of the top-shaped or bell-shaped involucre slightly margined, the outer narrowly oblong, very obtuse,* the innermost linear. — Mountains of Virginia and southward. Rare and obscure. Perhaps a remarkable state of L. spicata; but the flowers themselves as large as in No. 4.

6. **L. spicàta,** Willd. Smooth or somewhat hairy; stems .very leafy (2° – 5° high); leaves linear, the lower 3 – 5-nerved; heads 8 – 12 flowered (⅓' – ½' long), crowded in a long spike; *scales of the cylindrical-bell-shaped involucre oblong or oval, obtuse, appressed, with slight margins; achenia pubescent or smoothish.* — Moist grounds, common from S. New York southward and westward. — Involucre somewhat resinous, very smooth.

7. **L. graminifòlia,** Willd. Hairy or smoothish; stem (1° – 3° high) slender, leafy; leaves linear, elongated, 1-nerved; heads several or numerous, in a spike or raceme, 7 – 12-flowered; *scales of the obconical or obovoid involucre spatulate or oblong, obtuse or somewhat pointed, rigid, appressed; achenia hairy.* — Virginia and southward. — Inflorescence sometimes panicled, especially in

Var. **dùbia.** Scales of the involucre narrower and less rigid, oblong, often ciliate. (L. dubia, *Barton.*) — Wet pine barrens, New Jersey and southward.

8. **L. pycnostàchya,** Michx. Hairy or smoothish; stem stout (3° – 5° high), very leafy; leaves linear-lanceolate, the upper very narrowly linear; *spike very thick and dense* (6' – 20' long); heads about 5-flowered (⅓' long); *scales of the cylindrical involucre oblong or lanceolate, with recurved or spreading colored tips.* — Prairies, from Illinois southward and westward.

§ 2. *Stem simple or branched above, not from a tuber: heads small, corymbed or panicled, 4 – 10-flowered: involucre little imbricated: lobes of the corolla ovate: pappus not plumose.*

9. **L. odoratissima,** Willd. (VANILLA-PLANT.) *Very smooth; leaves pale,* thickish, obovate-spatulate, or the upper oval and clasping; *heads corymbed.* — Low pine barrens, Virginia and southward. — Leaves exhaling the odor of Vanilla when bruised.

10. **L. paniculàta,** Willd. *Viscid-hairy;* leaves narrowly oblong or lanceolate, smoothish, those of the stem partly clasping, *heads panicled.* — Virginia and southward.

CARPHÉPHORUS, Cass., differs from Liatris in having some chaff among the flowers; and C. TOMENTÒSUS perhaps grows in S. Virginia.

5. KÙHNIA, L. KUHNIA.

Heads 10-25-flowered: flowers perfect. Scales of the involucre few and loosely imbricated, lanceolate. Corolla slender, 5-toothed. Achenia cylindrical, many-striate. Pappus a single row of very plumose (white) bristles. — A perennial herb, resinous-dotted, with mostly alternate lanceolate leaves, and paniculate-corymbose heads of cream-colored flowers. (Dedicated to *Dr. Kuhn*, o. Pennsylvania, who brought the living plant to Linnæus.)

1. **K. eupatorioìdes,** L. Leaves varying from broadly lanceolate and toothed, to linear and entire. — Dry soil, New Jersey to Wisconsin and southward. Sept.

6. EUPATÒRIUM, Tourn. THOROUGHWORT.

Heads 3-many-flowered: flowers perfect. Involucre cylindrical or bell-shaped. Receptacle flat. Corolla 5-toothed. Achenia 5-angled. Pappus a single row of slender capillary barely roughish bristles. — Perennial herbs, often sprinkled with bitter resinous dots, with generally corymbose heads of white bluish, or purple blossoms, appearing near the close of summer. (Dedicated to *Eupator Mithridates*, who is said to have used a species of the genus in medicine.)

* *Heads cylindrical,* 5-10-*flowered; the purplish scales numerous, closely imbricated in several rows, of unequal length, slightly striate: stout herbs, with ample mostly whorled leaves, and flesh-colored flowers.*

1. **E. purpùreum,** L. (JOE-PYE WEED. TRUMPET-WEED.) Stems tall and stout, simple; leaves 3-6 in a whorl, oblong-ovate or lanceolate, pointed, very veiny, roughish, toothed; corymbs very dense and compound. — Varies greatly in size (2°-12° high), &c., and with spotted or unspotted, often dotted stems, &c., — including many nominal species. — Low grounds, common.

* * *Heads* 3-20-*flowered: involucre of* 8-15 *more or less imbricated and unequal scales, the outer ones shorter: flowers white.*

+ *Leaves all alternate, mostly dissected: heads panicled, very small,* 3-5-*flowered.*

2. **E. fœniculàceum,** Willd. Smooth or nearly so, paniculately much-branched (3°-10° high); leaves 1-2-pinnately parted, filiform. — Virginia, near the coast, and southward.

+ + *Leaves mostly opposite and sessile: heads* 5-8-*flowered, corymbed.*

3. **E. hyssopifòlium,** L. Minutely pubescent (1°-2° high); *leaves narrow, linear or lanceolate,* elongated, obtuse, 1-3-nerved, entire, or the lower sparingly toothed, often crowded in the axils or whorled, *acute at the base; scales of the involucre obtuse.* — Sterile soil, Massachusetts to Virginia, E. Kentucky and southward.

4. **E. leucòlepis,** Torr. & Gr. Minutely pubescent, simple (1°-2° high); *leaves linear-lanceolate, closely sessile,* 1-*nerved,* obtuse, *serrate, rough both sides;* corymb hoary; *scales of the involucre with white and scarious acute tips.* — Sandy bogs, Long Island, New Jersey, and southward.

5. **E. parviflòrum,** Ell. Minutely velvety-pubescent, branching (2°-3° high); *leaves lanceolate or oblong, triple-ribbed and veiny,* serrate above the

middle, *tapering to the base*, the lower slightly petioled; scales of the short involucre obtuse. (Leaves sometimes 3 in a whorl, or the upper alternate.) — Damp soil, Virginia and southward.

6. **E. altíssimum,** L. Stem stout and tall (5°-7° high), *downy; leaves lanceolate, tapering at both ends, conspicuously 3-nerved*, entire, or toothed above the middle, the uppermost alternate; corymbs dense; *scales of the involucre obtuse*, shorter than the flowers. — Dry soil, Penn. to Wisconsin and Kentucky. — Leaves 3′-4′ long, somewhat like those of a Solidago.

7. **E. álbum,** L. *Roughish-hairy* (2° high); *leaves oblong-lanceolate, coarsely-toothed, veiny;* heads clustered in the corymb; *scales of the involucre* closely imbricated, rigid, narrowly lanceolate, *pointed, white and scarious above, longer than the flowers.* — Sandy and barren places, pine barrens of New Jersey to Virginia and southward.

8. **E. teucrifòlium,** Willd. Roughish-pubescent (2°-3° high); *leaves ovate-oblong and ovate-lanceolate,* obtuse or truncate at the base, slightly triple-nerved, veiny, *coarsely toothed towards the base, the upper ones alternate;* branches of the corymb few, unequal; *scales of the involucre oblong-lanceolate, rather obtuse, at length shorter than the flowers.* (E. verbenæfolium, *Michx.*) — Low grounds, Massachusetts to Virginia and southward, near the coast. — Leaves sometimes cut into a few very deep teeth.

9. **E. rotundifòlium,** L. Downy-pubescent (2° high); *leaves roundish-ovate, obtuse,* truncate or slightly heart-shaped at the base, deeply crenate-toothed, triple-nerved, veiny, roughish (1′-2′ long); corymb large and dense; *scales of the* (*5-flowered*) *involucre linear-lanceolate,* slightly pointed. — Dry soil, Rhode Island to Virginia, near the coast, and southward.

10. **E. pubéscens,** Muhl. Pubescent; *leaves ovate, mostly acute,* slightly truncate at the base, serrate-toothed, somewhat triple-nerved, veiny; *scales of the 7-8-flowered involucre lanceolate,* acute. (E. ovàtum, *Bigel.*) — Massachusetts to New Jersey, near the coast, and Kentucky. — Like the last, but larger.

11. **E. sessilifòlium,** L. (UPLAND BONESET.) Stem tall (4°-6° high), *smooth,* branching; *leaves lanceolate or ovate-lanceolate, tapering from near the rounded sessile base to the sharp point,* serrate, veiny, smooth (3′-6′ long); corymb very compound, pubescent; *scales of the* 5- (*or* 5-12-?) *flowered involucre oval and oblong, obtuse.* — Copses and banks, Massachusetts to Ohio, and southward along the mountains.

+ + + *Leaves opposite, clasping or united at the base, long and widely spreading: heads* 10-15-*flowered: corymbs very compound and large.*

12. **E. resinòsum,** Torr. *Minutely velvety-downy* (2°-3° high); *leaves linear-lanceolate, elongated,* serrate, *partly clasping* at the base, tapering to the point, slightly veiny beneath (4′-6′ long); scales of the involucre oval, obtuse. — Wet pine barrens, New Jersey. — Name from the copious resinous globules of the leaves.

13. **E. perfoliàtum,** L. (THOROUGHWORT. BONESET.) Stem stout (2°-4° high), *hairy; leaves lanceolate, united at the base around the stem* (connate-perfoliate), tapering to a slender point, serrate, very veiny, wrinkled, downy

beneath (5′ – 8′ long); scales of the involucre linear-lanceolate. — Low grounds; common, and well known. — Varies with the heads 30 – 40-flowered.

+ + + + *Leaves opposite, the upper alternate, long-petioled: heads* 12 – 15-*flowered, in compound corymbs.*

14. **E. serótinum,** Michx. Stem pulverulent-pubescent, bushy-branched (3° – 6° high); leaves ovate-lanceolate, tapering to a point, triple-nerved and veiny, coarsely serrate (5′ – 6′ long); involucre very pubescent. — Alluvial ground, Illinois and southward.

* * * *Heads* 8 – 30-*flowered; the scales of the involucre nearly equal and in one row: leaves opposite, ovate, petioled, triple-nerved and veiny, not resinous-dotted: flowers white.*

15. **E. ageratoìdes,** L. (White Snake-root.) Smooth, branching (3° high); *leaves broadly ovate, pointed, coarsely and sharply toothed, long-petioled,* thin (4′ – 5′ long); corymbs compound. — Rich woods and copses; common, especially northward.

16. **E. aromáticum,** L. Smooth or slightly downy; stems nearly simple; *leaves on short petioles, ovate, rather obtusely toothed, not pointed,* thickish. — Copses, Massachusetts to Virginia and southward, near the coast. Lower and more slender than No. 15, with fewer, but usually larger heads.

7. MIKÀNIA, Willd. Climbing Hemp-weed.

Heads 4-flowered. Involucre of 4 scales. Receptacle small. Flowers and achenia, &c., as in Eupatorium. — Climbing perennials, with opposite commonly heart-shaped and petioled leaves, and corymbose-panicled flesh-colored flowers. (Named for *Prof. Mikan*, of Prague.)

1. **M. scándens,** L. Nearly smooth, twining; leaves somewhat triangular-heart-shaped or halberd-form, pointed, toothed at the base. — Copses along streams, Massachusetts to Kentucky and southward. July – Sept.

8. CONOCLÍNIUM, DC. Mist-flower.

Heads many-flowered. Involucre bell-shaped, the nearly equal linear-awl-shaped scales somewhat imbricated. Receptacle conical! Otherwise as in Eupatorium. — Perennial erect herbs, with opposite petioled leaves, and violet-purple or blue flowers in crowded terminal corymbs. (Name formed of κῶνος, *a cone,* and κλίνη, *a bed,* from the conical receptacle.)

1. **C. cœlestìnum,** DC. Somewhat pubescent (1° – 2° high); leaves triangular-ovate and slightly heart-shaped, coarsely and bluntly toothed. — Rich soil, Penn. to Michigan, Illinois, and southward. Sept.

9. NARDÓSMIA, Cass. Sweet Coltsfoot.

Heads many-flowered, somewhat diœcious: in the sterile plant with a single row of ligulate pistillate ray-flowers, and many tubular ones in the disk; in the fertile plant with many rows of minutely ligulate ray-flowers, and a few tubular perfect ones in the centre. Scales of the involucre in one row. Receptacle flat.

Achenia terete. Pappus of soft capillary bristles, longer and copious in the fertile flowers. — Perennial woolly herbs, with the leaves all from the rootstock, the scape with sheathing scaly bracts, bearing heads of purplish or whitish fragrant flowers in a corymb. (Name from *νάρδος*, *spikenard*, and *ὀσμή*, *odor*.)

1. **N. palmàta,** Hook. Leaves rounded, somewhat kidney-form, white-woolly beneath, palmately and deeply 5–7-lobed, the lobes toothed and cut. (Tussilago palmata, *Ait.* T. frigida, *Bigel.*) — Swamps, Maine and Mass. to Michigan and northward: rare. May. — Full-grown leaves 6′–10′ broad.

10. TUSSILÀGO, Tourn. COLTSFOOT.

Head many-flowered; the ray-flowers narrowly ligulate, pistillate, fertile, in many rows; the tubular disk-flowers few, staminate. Scales of the involucre nearly in a single row. Receptacle flat. Fertile achenia cylindrical-oblong. Pappus capillary, copious in the fertile flowers. — A low perennial, with horizontal creeping rootstocks, sending up scaly simple scapes in early spring, bearing a single head, and producing rounded-heart-shaped angled or toothed leaves later in the season, woolly when young. Flowers yellow. (Name from *tussis*, a cough, for which the plant is a reputed remedy.)

1. **T. Fárfara,** L. — Wet places, and along brooks, northern parts of New England and New York. (Nat. from Eu.)

11. ADENOCAÙLON, Hook. ADENOCAULON.

Heads 5–10-flowered; the flowers all tubular and with similar corollas; the marginal ones pistillate, fertile; the others staminate. Scales of the involucre equal, in a single row. Achenia elongated at maturity, club-shaped, beset with stalked glands above. Pappus none. — Slender perennials, with the alternate thin and petioled leaves smooth and green above, white woolly beneath, and few small (whitish) heads in a loose panicle, beset with glands (whence the name, from *ἀδήν*, *a gland*, and *καυλός*, *a stem*).

1. **A. bícolor,** Hook. Leaves triangular, rather heart-shaped, with angular-toothed margins; petioles margined. — Moist woods, shore of L. Superior, and northwestward.

12. SERICOCÁRPUS, Nees. WHITE-TOPPED ASTER.

Heads 12–15-flowered, radiate; the rays about 5, fertile (white). Involucre somewhat cylindrical or club-shaped; the scales closely imbricated in several rows, cartilaginous and whitish, appressed, with short and abrupt often spreading green tips. Receptacle alveolate-toothed. Achenia short, inversely pyramidal, very silky. Pappus simple, of numerous capillary bristles. — Perennial tufted herbs (1°–2° high), with sessile somewhat 3-nerved leaves, and small heads mostly in little clusters, disposed in a flat corymb. Disk-flowers pale yellow. (Name from *σηρικός*, *silky*, and *καρπός*, *fruit*.)

1. **S. solidagíneus,** Nees. Smooth, slender; *leaves linear*, *rigid*, obtuse, entire, with rough margins, tapering to the base; *heads narrow* (3″ long),

in close clusters, few-flowered; *pappus white.*—Thickets, S. New England to Virginia, near the coast. July.

2. **S. conyzoìdes,** Nees. Somewhat pubescent; *leaves oblong-lanceolate or the lower spatulate, mostly serrate* towards the apex, ciliate, *veiny;* heads rather loosely corymbed, obconical (4″–6″ long); *pappus rusty-color.*—Dry ground; common. July.

3. **S. tortifòlius,** Nees. Hoary-pubescent; *leaves obovate or oblong-spatulate, short* (½′–1′ long), *turned edgewise,* both sides alike, nearly veinless; heads rather loosely corymbed, obovoid (4″–5″ long); *pappus white.*—Pine woods, Virginia and southward. Aug.

GALATÉLLA HYSSOPIFÒLIA, Nees, is omitted, because it has not been found in our district, and probably is not an American plant.

13. ÁSTER, L. STARWORT. ASTER.

Heads many-flowered, radiate; the ray-flowers in a single series, fertile. Scales of the involucre more or less imbricated, usually with herbaceous or leaf-like tips. Receptacle flat, alveolate. Achenia generally more or less flattened. Pappus simple, of capillary bristles.—Perennial herbs (or annual in § 6), with corymbed, panicled, or racemose heads. Rays white, purple, or blue: the disk yellow, often changing to purple. (Name ἀστήρ, *a star,* from the appearance of the radiate heads of flowers.)

§ 1. BIÒTIA, DC.—*Involucre obovoid-bell-shaped; the scales regularly imbricated in several rows, appressed, nearly destitute of herbaceous tips: rays* 6–15 (*white or nearly so*): *achenia slender: lower leaves large, heart-shaped, petioled, coarsely serrate: heads in open corymbs.*

1. **A. corymbòsus,** Ait. *Stem slender,* somewhat zigzag; *leaves thin, smoothish, coarsely and unequally serrate with sharp spreading teeth, sharp-pointed,* ovate or ovate-lanceolate, all but the uppermost heart-shaped at the base and on slender naked petioles; *rays* 6–9.—Woodlands; common, especially northward. July–Aug.—Plant 1°–2° high, with smaller heads, looser corymbs, rounder and less rigid exterior involucral scales, and thinner leaves, than the next; not rough, but sometimes pubescent.

2. **A. macrophýllus,** L. *Stem stout and rigid* (2°–3° high); *leaves thickish, rough, closely serrate,* somewhat pointed; the lower heart-shaped (4′–10′ long, 3′–6′ wide), long-petioled; the upper ovate or oblong, sessile or on margined petioles; heads in ample rigid corymbs; *rays* 12–25 (white or bluish).—Moist woods; common northward, and southward along the mountains. Aug., Sept.—Involucre ½′ broad; the outer scales rigid, oblong or ovate-oblong, the innermost much larger and thinner.

§ 2. CALLIÁSTRUM, Torr. & Gr.—*Scales of the involucre imbricated in several rows, coriaceous, with herbaceous spreading tips: rays* 12–30, *violet: achenia narrow* (*smoothish*): *pappus of rigid bristles of unequal thickness: stem-leaves all sessile; lower ones not heart-shaped: heads few, large and showy.* (Allied to § 1, and to Sericocarpus.)

3. **A. Rádula,** Ait. Stem simple or corymbose at the summit, smooth, many-leaved (1°-3° high); *leaves oblong-lanceolate, pointed, sharply serrate in the middle, very rough both sides and rugose-veined,* closely sessile (2'-3' long), nearly equal; *scales of the bell-shaped involucre oblong, appressed, with very short and slightly spreading herbaceous tips;* achenia smooth.—Bogs and low grounds, Delaware to Maine and northward, near the coast. Aug.—Rays light violet. Involucre nearly smooth, except the ciliate margins.

4. **A. surculòsus,** Michx. Stems slender (½°-1° high), from long and slender, or here and there tuberous-thickened, *creeping subterranean shoots or suckers,* roughish-pubescent above, 1-2- or corymbosely several-flowered; *leaves roughish, obscurely toothed,* lanceolate or the lower oblong-spatulate; *involucre obconical* or bell-shaped (⅓'-½' long), the whitish and coriaceous *scales with short herbaceous tips, the outer ones shorter;* achenia slightly pubescent.—Var. GRÀCILIS (A. gracilis, *Nutt.*) is a form with the scales of the narrower obconical involucre successively shorter and with very short and scarcely spreading green tips, resembling a Sericocarpus.—Moist grounds, pine barrens of New Jersey and southward. Sept.—Rays about 12, violet, ½' long.—Perhaps runs into the next.

5. **A. spectábilis,** Ait. Stems (1°-2° high) minutely rough and glandular-pubescent at the summit; *leaves oblong-lanceolate, roughish, obscurely toothed, tapering to the base; scales of the short and almost hemispherical involucre linear-oblong, with conspicuous spatulate glandular-downy tips, the outermost scarcely shorter;* achenia slightly pubescent.—Sandy soil, Massachusetts to New Jersey, near the coast, and southward. Sept.-Nov.—One of the handsomest of the genus, though the heads are few. The rays, about 20, are narrowly lanceolate, nearly 1' long, very deep violet-blue. Involucre ½' long and wide.

§ 3. ASTER PROPER.—*Scales of the involucre imbricated in various degrees, with herbaceous or leaf-like summits, or the outer ones entirely foliaceous: rays numerous: pappus soft and nearly uniform: achenia flattened.* (All flowering late in summer or in autumn.)

* *Leaves silvery-silky both sides, all sessile and entire, mucronulate: involucre imbricated in 3 to several rows: rays showy, purple-violet.*

6. **A. sericeus,** Vent. Stems slender, branched; leaves lanceolate or oblong; *heads mostly solitary,* terminating the short silvery branchlets; *scales of the globular involucre similar to the leaves, spreading,* except the short coriaceous base, silvery; *achenia smooth,* many-ribbed.—Prairies and dry banks, Wisconsin to Kentucky and southward.—An elegant silvery species; the large heads with 20-30 rays of ½' or more in length.

7. **A. cóncolor,** L. Stems wand-like, nearly simple; *leaves crowded, oblong or lanceolate, appressed,* the upper reduced to little bracts; *heads in a simple or compound wand-like raceme;* scales of the obovoid involucre closely imbricated in several rows, appressed, rather rigid, silky, lanceolate *achenia silky.*—Dry sandy soil, pine barrens of New Jersey and southward.—A handsome plant, 1°-3° high, with the short leaves 1' or less in length, grayish-silky and of the same hue both sides. Rays bright violet-purple.

* * *Lower leaves not heart-shaped; the upper all sessile and more or less clasping by a heart-shaped or auricled base: heads showy: scales of the inversely conical or bell-shaped involucre regularly imbricated in several rows, the outer successively shorter, appressed, coriaceous, whitish, with short herbaceous tips: rays large, purple or blue.*

8. **A. pàtens,** Ait. *Rough-pubescent;* stem loosely panicled above (1°–3° high), with widely spreading branches, the heads mostly solitary, terminating the slender branchlets; *leaves* oblong-lanceolate or ovate-oblong, often contracted below the middle, *all clasping by a deep auricled-heart-shaped base,* rough, especially above and on the margins, entire; scales of the minutely roughish involucre with spreading pointed tips; *achenia silky.* — Var. PHLOGIFÒLIUS is a form which the plant assumes in shady moist places, with larger and elongated thin scarcely rough leaves, downy underneath, sometimes a little toothed above, mostly much contracted below the middle. — Dry ground, common, especially southward. Heads ½′ broad, and with showy deep blue-purple rays.

9. **A. læ̀vis,** L. *Very smooth throughout;* heads in a close panicle; leaves thickish, lanceolate or ovate-lanceolate, chiefly entire, the upper more or less clasping by an auricled or heart-shaped base; scales of the *short-obovoid or hemispherical involucre* with appressed green points; rays sky-blue; *achenia smooth.* A variable species, of which the two best-marked forms are: —

Var. **lævigàtus.** Scarcely if at all glaucous; leaves lanceolate or oblong; involucre nearly hemispherical; the scales lanceolate or linear, with narrow and acute green tips tapering down on the midnerve. (A. lævis, *L.* A. lævigatus, *Willd.*) — Dry woodlands; rather common.

Var. **cyàneus.** Very smooth, but pale or glaucous; leaves thicker; the upper often oblong or ovate-lanceolate, clasping by a heart-shaped base; involucre narrowed at the base, of broader and more coriaceous scales with shorter and abrupt tips. (A. cyaneus, *Hoffm., &c.*) — Border of woodlands; common, especially northward. — A very elegant species, with showy flowers.

10. **A. turbinéllus,** Lindl. *Very smooth;* stem slender, paniculately branched; *leaves lanceolate,* tapering to each end, entire, with rough margins; *involucre elongated-obconical* or almost club-shaped (½′ long); the scales linear, with very short and blunt green tips; rays violet-blue; *achenia nearly smooth.* — River-banks, Illinois and southwestward.

* * * *Lower leaves all heart-shaped and petioled, the upper sessile or petioled: involucre imbricated much as in the last division, but the heads smaller, very numerous, racemose or panicled.*

+ *Leaves entire or slightly serrate: heads middle-sized: rays bright-blue.*

11. **A. azùreus,** Lindl. Stem rather rough, erect, racemose-compound at the summit, the branches slender and rigid; *leaves rough; the lower ovate-lanceolate or oblong, heart-shaped, on long often hairy petioles; the others lanceolate or linear, sessile,* on the branches awl-shaped; involucre inversely conical. — Copses and prairies, Ohio to Wisconsin and southward. — A handsome species; the involucre much as in No. 9, but much smaller, and slightly pubescent; the rays bright blue.

12. **A. Shórtii,** Boott. Stem slender, spreading, nearly smooth, bearing very numerous heads in racemose panicles; *leaves smooth above, minutely pubescent*

underneath, lanceolate or ovate-lanceolate, elongated, tapering gradually to a sharp point, *all but the uppermost more or less heart-shaped at the base and on naked petioles;* involucre bell-shaped. — Cliffs and banks, Ohio to Wisconsin and southward. — A pretty species, 2°-4° high; the leaves 3′-5′ long.

13. **A. undu,làtus,** L. Pale or somewhat hoary with close pubescence; stem spreading, bearing numerous heads in racemose panicles; *leaves ovate or ovate-lanceolate, with wavy or slightly toothed margins, roughish above, downy underneath,* the lowest heart-shaped on margined petioles, the others *abruptly contracted into short broadly winged petioles which are dilated and clasping at the base,* or directly sessile by a heart-shaped base; involucre obovoid. (A. diversifòlius, *Michx.*) — Dry copses, common.

+- +- *Leaves conspicuously serrate: heads small: rays pale blue or nearly white.*

14. **A. cordifòlius,** L. Stem much branched above, *the spreading or diverging branches bearing very numerous panicled heads;* lower leaves all heart-shaped, on slender and mostly naked ciliate petioles; *scales of the inversely conical involucre all appressed and tipped with short green points, obtuse or acutish.* — Woodlands; very common. Varies with the stem and leaves either smooth, roughish, or sometimes hairy underneath. Heads produced in great profusion, but quite small.

15. **A. sagittifòlius,** Willd. Stem rigid, erect, with *ascending branches bearing numerous racemose heads;* leaves ovate-lanceolate, pointed; the lower heart-shaped at the base, on margined petioles; the upper lanceolate or linear, pointed at both ends; *scales of the oblong involucre linear, tapering into awl-shaped slender and loose tips.* — Dry ground, New York and Penn. to Wisconsin and Kentucky. — Usually more or less hairy or downy; the heads rather larger than in the last, almost sessile. — A. Drummondii, *Lindl.*, which probably grows on the Illinois side of the Mississippi, is apparently only a downy-leaved variety of this.

* * * * *Leaves none of them heart-shaped; those of the stem sessile, narrow, rigid, entire: involucre imbricated in several rows: the coriaceous scales appressed and whitish at the base, with abrupt and conspicuous spreading herbaceous tips: heads small and very numerous, paniculate-racemose: rays white.*

16. **A. ericoìdes,** L. *Smooth or sparingly hairy* (1°-1½° high); the simple branchlets or peduncles racemose along the upper side of the wand-like spreading branches; *lowest leaves oblong-spatulate,* sometimes toothed; *the others linear-lanceolate or linear-awl-shaped, acute at both ends; scales of the involucre broadest at the base, with acute or awl-shaped green tips.* — Var. VILLÒSUS is a hairy form, often with broader leaves; chiefly in the Western States. — Dry open places, S. New England to Wisconsin and southward.

17. **A. multiflòrus,** Ait. *Pale or hoary with minute close pubescence* (1° high), much branched and bushy; the heads much crowded on the spreading racemose branches; *leaves crowded, linear,* spreading, with rough or ciliate margins, *the upper somewhat dilated and partly clasping at the base; scales of the involucre with spatulate spreading green tips broader than the lower portion,* the outer obtuse. — Dry gravelly or sandy soil; common.

* * * * * *Leaves none of them heart-shaped; those of the stem tapering at the base, sessile; involucre imbricated; the scales of unequal length, with short and narrow appressed or rather loose greenish tips: heads small or middle-sized: rays white or pale bluish-purple.*

+ *Heads small.* (*Involucre ⅕′ – ¼′ long.*)

18. **A. dumòsus,** L. *Smooth* or nearly so, racemosely compound, *the scattered heads mostly solitary at the end of the spreading branchlets;* leaves linear or the upper oblong, crowded, entire or slightly serrate, with rough margins; *scales of the closely imbricated involucre linear-spatulate, obtuse,* in 4 – 6 rows. — Thickets, in dry or moist soil; common. — A variable species, 1° – 3° high, loosely branched, with small leaves, especially the upper, and an inversely conical or bell-shaped involucre, with more abrupt green tips than any of the succeeding. Rays pale purple or blue, larger than in the next. Runs into several peculiar forms.

19. **A. Tradescánti,** L. *Smooth or smoothish; the numerous heads closely racemed* along one side of the erect-spreading or diverging branches; leaves lanceolate-linear, elongated, the larger ones remotely serrate in the middle with fine sharp teeth; *scales of the involucre narrowly linear, acute or acutish,* imbricated in 3 or 4 rows. — Var. FRÁGILIS has the leaves entire or nearly so, except the lowest, and the heads more scattered. — Moist banks, &c., very common. — Stems 2° – 4° high, bushy: heads very numerous, smaller than in the last. Rays white or nearly so.

20. **A. mìser,** L., Ait. *More or less hairy,* much branched; the branches usually diverging, *bearing racemose often scattered heads; leaves* lanceolate or oblong-lanceolate, tapering or pointed at each end, *sharply serrate in the middle; scales of the involucre linear, acute or rather obtuse,* imbricated in 3 or 4 rows. — Thickets, fields, &c., very common, and extensively variable. — Leaves larger than in either of the preceding (2′ – 5′); the involucre intermediate between them, as to the form of the scales. Rays mostly short, pale bluish-purple or white.

+ + *Heads middle-sized.* (*Involucre ¼′ – ⅓′ long.*)

21. **A. símplex,** Willd. Smooth or nearly so (3° – 6° high), much branched; the *branches and scattered heads somewhat corymbose* at the summit; *leaves lanceolate, pointed, the lower serrate; scales of the involucre linear-awl-shaped, loosely and sparingly imbricated.* — Shady moist banks, common. — Rays pale. Approaches in its different forms the preceding and the two following.

22. **A. tenuifòlius,** L. Nearly smooth; stem much branched (2° – 3° high); the heads somewhat panicled or racemed; *leaves narrowly lanceolate, tapering into a long slender point* (2′ – 6′ long), with rough margins, *the lower somewhat serrate* in the middle; *scales of the hemispherical involucre linear-awl-shaped, very slender-pointed, numerous, closely imbricated.* — Low grounds, New York to Wisconsin, and southward. Rays short and narrow, pale purple or whitish.

23. **A. cárneus,** Nees. Smooth, or the branches rough or pubescent; *leaves lanceolate,* somewhat pointed, or the upper short and partly clasping; heads racemose along the ascending leafy branches; *scales of the obovate involucre lanceolate, abruptly acute, closely imbricated.* — Moist soil; common. Leaves firm in texture, smooth, or rough above. Rays rather large, bluish, purplish,

violet-purple, or almost white. — On a thorough revision of the genus, older names will be found and verified for this and No. 21, which here cover a multitude of forms. A. mutábilis, *L.*, is probably one of them.

* * * * * * *Stem-leaves sessile, the upper more or less clasping: scales of the hemispherical involucre loosely more or less imbricated, somewhat equal, with herbaceous tips, or the outer often entirely herbaceous: heads middle-sized or large: rays blue or purple.* (The species of this group are still perplexing.)

24. **A. æstìvus,** Ait. *Stem slender, rough*, bushy-branched; *leaves narrowly lanceolate-linear, elongated*, taper-pointed, *entire*, with rough margins; heads corymbose, loose; *scales of the involucre linear, loose;* rays large, apparently light blue. (A. laxifolius, *Nees.*) — Var. LÆTIFLÒRUS has very slender branches and leaves, and the scales of the involucre unequal and more appressed. — Moist shady places, Ohio to Wisconsin and northward. Heads about as large as in A. puniceus, in some forms appearing more like A. carneus. Leaves 4′–7′ long, ¼′ to ½′ wide.

25. **A. Novi-Bélgii,** L. *Nearly smooth; stem stout; leaves oblong-lanceolate, pale, or somewhat glaucous, serrate* in the middle, acute, tapering to each end; *scales of the involucre rather closely imbricated, with broadish acute herbaceous tips;* rays pale blue or purplish. — Low grounds, not clearly known in a wild state. The plant here in view is intermediate between No. 23 and No. 26. — Heads smaller and less showy than in the next.

26. **A. longifòlius,** Lam. *Smooth* or nearly so; stem branched, corymbose-panicled at the summit; *leaves lanceolate or linear,* or the lower ovate-lanceolate, entire or sparingly serrate in the middle, taper-pointed, *shining above; scales of the involucre imbricated in 3–5 rows, linear, with acute or awl-shaped spreading or recurved green tips;* rays large and numerous, bright purplish-blue. — Moist places, along streams, &c., common eastward. — Plant 1°–5° high, with large and showy heads; very variable in the foliage, involucre, &c.; its multiform varieties including A. thyrsiflorus, *Hoffm.*, A. láxus, *Willd.* (a form with more leafy involucres), A. præáltus, *Poir.*, A. elòdes, *Torr. & Gr.*, &c.

27. **A. puniceus,** L. *Stem tall and stout, rough-hairy* all over or in lines, usually purple below, panicled above; *leaves oblong-lanceolate, clasping by an auricled base, sparingly serrate* in the middle *with appressed teeth, rough above,* nearly smooth underneath, pointed; *scales of the involucre narrowly linear, acute, loose, equal,* in about 2 rows; rays long and showy (lilac-blue, paler or whitish in shade). — Low thickets and swamps, very common. — Stems 3°–6° high, in open grounds rough with rigid bristly hairs.

Var. **vimineus** (A. vimineus, *Willd.*) is a variety nearly smooth throughout; growing in shade.

28. **A. prenanthoìdes,** Muhl. *Stem low* (1°–3° high), corymbose-panicled, *hairy above in lines; leaves rough above, very smooth underneath, ovate-lanceolate, sharply cut-toothed in the middle, conspicuously taper-pointed, and tapering below in a long contracted entire portion, which is abruptly dilated into an auricled-heart-shaped clasping base;* scales of the involucre narrowly linear, with recurved-spreading tips; rays light blue. — Borders of rich woods, W. New York and Penn. to Wisconsin.

* * * * * * * *Leaves entire, those of the stem sessile, the base often clasping: heads solitary terminating the branches or somewhat corymbed, large or middle-sized, showy; scales of the involucre very numerous, with loose and spreading or recurved mostly foliaceous tips, usually more or less glandular or viscid, as are the branchlets, &c.*

+ *Involucre imbricated, the scales in several or many ranks.*

29. A. **grandiflòrus,** L. *Rough with minute hispid hairs;* stems slender loosely much-branched (1°–3° high); *leaves very small* (¼′–1′ long), oblong-linear, obtuse, rigid; the uppermost passing into scales of the hemispherical squarrose many-ranked involucre; rays bright violet (1′ long); achenia hairy.—Dry open places, Virginia and southward.—Heads large and very showy.

30. A. **oblongifòlius,** Nutt. *Minutely glandular-puberulent,* much branched above, rigid, paniculate-corymbose (1°–2° high); *leaves narrowly oblong or lanceolate,* mucronate-pointed, partly clasping, thickish (1′–2′ long by 2″–5″ wide); scales of the involucre broadly linear, appressed at the base; rays violet-purple; achenia canescent.—Banks of rivers, from Penn. (Huntingdon County, *Porter!*) and Virginia to Wisconsin and Kentucky.—Flowers not half as large as those of the next.

A. AMETHÝSTINUS, Nutt., of Eastern Massachusetts, is a still wholly obscure species.

+ + *Involucre of many very slender equal scales appearing like a single row.*

31. A. **Novæ-Angliæ,** L. *Stem stout, hairy* (3°–8° high), corymbed at the summit; *leaves very numerous, lanceolate, entire, acute, auriculate-clasping, clothed with minute pubescence: scales of the involucre linear-awl-shaped, loose, glandular-viscid,* as well as the branchlets; rays violet-purple, sometimes rose-purple (A. roseus, *Desf.*), very numerous; achenia hairy.—Moist grounds; common.—Heads large, corymbed.

* * * * * * * * *Head and imbricated involucre with leafy tips as in the preceding group; but the foliage as in* * * *.

32. A. **anómalus,** Engelm. Somewhat hoary-pubescent; stems slender (2°–4° high), simple or racemose-branched above; leaves ovate or ovate-lanceolate, pointed, entire or nearly so, the lower cordate and long-petioled, the upper small and almost sessile; scales of the hemispherical involucre imbricated in several rows, appressed, with linear spreading leafy tips; achenia smooth.—Limestone cliffs, W. Illinois (and Missouri), *Engelmann.*—Heads as large as those of No. 30: rays violet-purple.

§ 4. ORITRÒPHIUM, Kunth.—*Scales of the involucre narrow, nearly equal and almost in a single row, more or less herbaceous: pappus of soft and uniform capillary bristles: mostly low perennials, bearing solitary or few heads.*

33. A. **graminifòlius,** Pursh. Slightly pubescent, slender (6′–12 high); leaves very numerous, narrowly linear; branches prolonged into slender naked peduncles, bearing solitary small heads; rays rose-purple or whitish.—New Hampshire, about the White Mountains (*Mr. Eddy in herb. Tuckerman*), L. Superior, and northward.

§ 5. ORTHÓMERIS, Torr. & Gr.—*Scales of the involucre regularly imbricated, unequal, often carinate, with membranaceous margins, entirely destitute of herbaceous tips: pappus of soft and unequal capillary bristles.*

34. **A. acuminàtus,** Michx. Somewhat hairy; stem (about 1° high) simple, zigzag, panicled-corymbose at the summit; peduncles slender; *leaves oblong-lanceolate, conspicuously pointed, coarsely toothed* above, wedge-form and entire at the base; scales of the involucre few and loosely imbricated, linear-lanceolate, pointed, thin (3′-5′ long); heads few or several; rays 12-18, white, or slightly purple. — Cool rich woods, common northward and southward along the Alleghanies. Aug. — There is a depauperate narrow-leaved variety on the White Mountains of New Hampshire.

35. **A. nemoràlis,** Ait. Minutely roughish-pubescent; stem slender, simple or corymbose at the summit, very leafy (1°-2° high); *leaves* small (1′-1½′ long), rather *rigid, lanceolate,* nearly *entire, with revolute margins;* scales of the inversely conical involucre narrowly linear-lanceolate, the outer passing into awl-shaped bracts; rays lilac-purple, elongated. — Bogs, pine barrens of New Jersey to Maine along the coast, and northward. Also White Mountains of New Hampshire; a small form, with solitary heads. Sept.

36. **A. ptarmicoìdes,** Torr. & Gr. Smooth or roughish; stems clustered (6′-15′ high), simple; *leaves linear-lanceolate, acute, rigid,* entire, tapering to the base, 1-3-nerved, with rough margins (2′-4′ long); *heads small, in a flat corymb;* scales of the involucre imbricated in 3 or 4 rows, short; *rays white* (2″-3″ long). — Dry rocks, W. Vermont to Wisconsin along the Great Lakes, and northward. Aug.

§ 6. OXYTRIPÒLIUM, DC. — *Scales of the involucre imbricated, without herbaceous tips, usually very acute, the outer passing into scale-like bracts: pappus soft and capillary: achenia striate.*

37. **A. flexuòsus,** Nutt. Stem zigzag, rigid, forked (6′-20′ high); the *branches bearing large solitary heads; leaves linear, thick and fleshy,* pointed, entire; scales of the bell-shaped *involucre imbricated in many rows,* ovate-lanceolate with awl-shaped points; *rays numerous, large,* pale purple. — Salt marshes, on the coast, Maine to Virginia. Sept.

38. **A. linifòlius,** L. Stem much branched (6′-24′ high), the *branches bearing numerous racemose or panicled small heads; leaves linear-lanceolate,* pointed, entire, flat, on the branches awl-shaped; scales of the oblong *involucre linear-awl-shaped, in few rows; rays somewhat in two rows, short, not projecting beyond the disk,* more numerous than the disk-flowers, purplish. (A. subulàtus, *Michx.*) — Salt marshes, on the coast, Maine to Virginia.

14. ERÍGERON, L. FLEABANE.

Heads many-flowered, radiate, mostly flat or hemispherical; the narrow rays very numerous, pistillate. Scales of the involucre narrow, nearly equal and almost in a single row. Receptacle flat, naked. Achenia flattened, usually pubescent and 2-nerved. Pappus a single row of capillary bristles, with minuter ones intermixed, or with a distinct short outer pappus of little bristles or chaffy scales. — Herbs, with entire or toothed and generally sessile leaves, and solitary or corymbed heads. Disk yellow: ray white or purple. (Name from ἦρ, spring, and γέρων, *an old man*, suggested by the hoary appearance of some of the vernal species.)

§ 1. CÆNÒTUS, Nutt. — *Rays inconspicuous, in several rows, scarcely longer than the pappus: disk-corollas 4-toothed: pappus simple: annuals and biennials: heads very small, cylindrical.*

1. **E. Canadénse,** L. (HORSE-WEED. BUTTER-WEED.) Bristly-hairy; *stem erect, wand-like* (5′ – 5° high); leaves linear, mostly entire; those from the root cut-lobed; *heads* very numerous, *panicled.* — Waste places; a common weed, now widely diffused over the world. July – Oct. — Ligules much shorter than their tube, white.

2. **E. divaricàtum,** Michx. *Diffuse and decumbent* (3′ – 6′ high); leaves linear or awl-shaped; *heads loosely corymbed; rays purple:* otherwise like No. 1. — Illinois, Kentucky, and southward.

§ 2. EUERÍGERON, Torr. & Gr. — *Rays elongated, crowded in one or more rows: pappus simple.* (*Erect perennials: heads somewhat corymbed.*)

3. **E. bellidifòlium,** Muhl. (ROBIN'S PLANTAIN.) Hairy, *producing offsets from the base; stem simple, rather naked above,* bearing few (1 – 9) large heads on slender peduncles, root-leaves obovate and spatulate, sparingly toothed; those of the stem distant, lanceolate-oblong, partly clasping, entire; *rays* (*about* 50) *rather broadly linear, light bluish-purple.* — Copses and moist banks; common. May.

4. **E. Philadélphicum,** L. (FLEABANE.) Hairy; *stem leafy,* corymbed, bearing several small heads; leaves thin, with a broad midrib, oblong; the upper smoothish, clasping by a heart-shaped base, mostly entire; the lowest spatulate, toothed; *rays innumerable and very narrow, rose-purple* or flesh-color. (E. purpùreum, *Ait.*) — Moist ground; common. June – Aug.

§ 3. STENÁCTIS, Cass. — *Some of the outer bristles of the pappus short and minute, or rather chaffy: otherwise as* § 2.

5. **E. glabéllum,** Nutt. Stem (6′ – 15′ high) stout, hairy above, the leafless summit bearing 1 – 7 large heads; leaves nearly glabrous, except the margins, entire, the upper oblong-lanceolate and pointed, closely sessile or partly clasping, the lower spatulate and petioled; rays (more than 100, purple) more than twice the length of the hoary-hispid involucre. — Plains, St. Croix River, Wisconsin, and northward. June.

§ 4. PHALACROLÒMA, Cass. — *Rays numerous, but nearly in a single row, conspicuous: pappus plainly double, the outer a crown of minute chaffy-bristle-form scales; the inner of scanty capillary bristles which are deciduous, or entirely wanting in the ray: annuals and biennials.*

6. **E. ánnuum,** Pers. (DAISY FLEABANE. SWEET SCABIOUS.) Stem stout (3° – 5° high), branched, *beset with spreading hairs; leaves coarsely and sharply toothed; the lowest ovate,* tapering into a margined petiole; the upper ovate-lanceolate, acute and entire at both ends; heads corymbed; rays white, tinged with purple, not twice the length of the bristly involucre. (E. heterophýllum, *Muhl.* E. strigòsum, *Bigel.*) — Fields and waste places; a very common weed. (Nat. in Europe.) June – Aug.

7. **E. strigòsum,** Muhl. (Daisy Fleabane.) Stem panicled-corymbose at the summit, *roughish* like the leaves *with minute appressed hairs, or almost smooth; leaves entire* or nearly so, the upper *lanceolate,* scattered, the lowest oblong or spatulate, tapering into a slender petiole; rays white, twice the length of the minutely hairy involucre. (E. integrifòlium, *Bigel.*) — Fields, &c.; common. June – Aug. — Stem smaller and more simple than the last, with smaller heads but longer rays.

§ 5. ERIGERÍDIUM, Torr. & Gr. — *Rays about 30, in a single row, rather broad: pappus simple: achenia mostly 4-nerved: not perennial.*

8. **E. vérnum,** Torr. & Gr. Glabrous; leaves clustered at the root, oval or spatulate; scape leafless, slender (1° – 2° high), bearing 5 – 12 small corymbed heads; rays white. (E. nudicaule, *Michx.* Aster vernus, *L.*) — Low grounds, E. Virginia and southward. May.

15. DIPLOPÁPPUS, Cass. Double-bristled Aster.

Heads many-flowered, radiate; the rays 8 – 12, pistillate. Scales of the involucre imbricated, appressed, narrow, 1-nerved or keeled, destitute of herbaceous tips. Receptacle flat, alveolate. Achenia flattish. Pappus double; the outer of very short and small stiff bristles, the inner of capillary bristles as long as the disk-corolla. — Perennials with corymbose or simple heads: disk-flowers yellow; rays white or violet. (Name composed of διπλόος, *double,* and πάππος, *pappus,* the character which distinguishes the genus from Aster.)

§ 1. *Rays violet, showy: head solitary, pretty large: involucre much imbricated. achenia silky: bristles of the inner pappus all alike.*

1. **D. linariifòlius,** Hook. Stems (6′ – 20′ high), several from the same woody root, mostly simple, very leafy; leaves rigid, spreading, linear, strongly 1-nerved, smooth, with very rough margins. — Dry soil; common. Sept., Oct.

§ 2. *Rays white: heads small, corymbed: involucre shorter than the disk, imbricated in about 3 rows: achenia smoothish: bristles of the inner pappus unequal, some of them thickened at the tip: leaves large, scattered, membranaceous, veiny, entire.*

2. **D. umbellàtus,** Torr. & Gr. Smooth, leafy to the top (2° – 6° high); *leaves lanceolate, elongated, taper-pointed* and tapering at the base (3′ – 6′ long); heads very numerous in compound flat corymbs; scales of the involucre rather closely imbricated, obtusish. — Moist thickets; common, especially northward. Aug.

3. **D. amygdálinus,** Torr. & Gr. Smooth or roughish above, leafy; *leaves ovate-lanceolate, acute,* abruptly narrowed at the base; scales of the involucre loosely imbricated, obtuse. — Low grounds, New Jersey, Penn., and southward. Aug. — Very near the last, usually lower, rougher, and with broader and shorter leaves.

4. **D. cornifòlius,** Darl. Stem (1° – 2° high) pubescent, *bearing few heads on divergent peduncles; leaves elliptical or ovate-lanceolate, conspicuously pointed* at both ends, ciliate, hairy on the veins underneath. — Woodlands, E. Massachusetts to Kentucky, and southward along the mountains. July – Sept.

16. BOLTÒNIA, L'Her. BOLTONIA

Heads many-flowered, radiate; the rays numerous, pistillate. Scales of the hemispherical involucre imbricated somewhat in 2 rows, appressed, with narrow membranaceous margins. Receptacle conical or hemispherical, naked. Achenia flat, obovate or inversely heart-shaped, margined with a callous wing, or in the ray 3-winged, crowned with a pappus of several minute bristles and frequently with 2-4 longer awns. — Perennial and bushy-branched smooth herbs, pale green, with the aspect of Aster: the thickish leaves chiefly entire. Heads loosely corymbose or panicled: disk yellow: rays white or purplish. (Dedicated to *I. Bolton*, an English botanist.)

1. **B. asteroìdes,** L'Her. Leaves lanceolate; achenia broadly oval; pappus of few minute bristles and no awns. — Moist places along streams, Pennsylvania (*Bartram*) and southward along the Alleghanies: rare. Oct. — Plant usually 6° high.

2. **B. glastifòlia,** L'Her. Leaves lanceolate, ascending, often turned edgewise by a twist; achenia obovate, broadly winged; pappus of several short bristles and, especially in the disk, of 2 or 3 short awns. — Rich moist soil, Pennsylvania to Illinois and southward. Sept. — Plant 2° - 4° high.

17. BÉLLIS, Tourn. DAISY.

Heads many-flowered, radiate; the rays numerous, pistillate. Scales of the involucre herbaceous, equal, in about 2 rows. Receptacle conical, naked. Achenia obovate, flattened, wingless, and without any pappus. — Low herbs (all but one species natives of the Old World), either stemless, like the true *Daisy*, B. perennis, or leafy-stemmed, as is our species. (The Latin name, from *bellus*, pretty.)

1. **B. integrifòlia,** Michx. (WESTERN DAISY.) Diffusely branched and spreading (4' - 9' high), smoothish; leaves lanceolate or oblong, the lower spatulate-obovate; heads on slender peduncles; rays pale violet-purple. ① ② — Prairies and banks, Kentucky and southwestward. March - June.

18. BRACHYCHÆTA, Torr. & Gr. FALSE GOLDEN-ROD.

Heads and flowers nearly as in Solidago, except the pappus, which is a row of minute rather scale-like bristles shorter than the achenia. — A perennial herb, with rounded or ovate serrate leaves, all the lower ones heart-shaped; the small yellow heads in sessile clusters racemed or spiked on the branches. (Name composed of βραχύς, *short*, and χαίτη, *bristle*, from the pappus.)

1. **B. cordàta,** Torr. & Gr. (Solidago cordata, *Short.*) Wooded hills, E. Kentucky and southward. Oct. — Plant 2° - 4° high, slender, more or less pubescent.

19. SOLIDÀGO, L. GOLDEN-ROD.

Heads few - many-flowered, radiate; the rays 1 to 16, pistillate. Scales of the oblong involucre appressed, destitute of herbaceous tips (except No. 1). Receptacle small, not chaffy Achenia many-ribbed, nearly terete. Pappus simple, of equal capillary bristles. — Perennial herbs, with mostly wand-like stems and nearly sessile stem-leaves, never heart-shaped. Heads small, racemed or clustered: flowers both of the disk and ray (except No. 2) yellow. (Name from *solido*, to join, or make whole, in allusion to its reputed vulnerary qualities.) Flowering Aug. - Oct.

§ 1. CHRYSÁSTRUM, Torr. & Gr. — *Scales of the much imbricated rigid involucre with abruptly spreading herbaceous tips: heads in clusters or glomerate racemes disposed in a dense somewhat leafy and interrupted wand-like compound spike.*

1. **S. squarròsa,** Muhl. Stem stout (2° - 5° high), hairy above; leaves large, oblong, or the lower spatulate-oval and tapering into a margined petiole, serrate, veiny; disk-flowers 16 - 24, the rays 12 - 16. — Rocky wooded hills, Maine and W. Vermont to Penn., and the mountains of Virginia.

§ 2. VIRGAÙREA, Tourn. *Scales of the involucre destitute of herbaceous tips: rays mostly fewer than the disk-flowers: heads all more or less pedicelled.*

* *Heads in close clusters or short clustered racemes in the axils of the feather-veined leaves.* (*Rays* 3 - 6.)

2. **S. bicolor,** L. *Hoary or grayish with soft hairs;* stem mostly simple; leaves oblong or elliptical-lanceolate, acute at both ends, or the lower oval and tapering into a petiole, slightly serrate; *clusters or short racemes from the axils of the upper leaves,* forming an interrupted spike or crowded panicle; *rays small, cream-color or nearly white.* — Var. CÓNCOLOR has the *rays yellow.* — Dry copses and banks, common: the var. in Pennsylvania and westward.

3. **S. latifòlia,** L. Smooth or nearly so, *stem angled, zigzag,* simple or paniculate-branched (1° - 3° high); *leaves broadly ovate or oval, very strongly and sharply serrate, conspicuously pointed at both ends* (thin, 3′ - 6′ long); heads in very short axillary sessile clusters, or somewhat prolonged at the end of the branches. — Moist shaded banks, in rich soil; common northward, and along the mountains.

4. **S. cæ̀sia,** L. Smooth; *stem terete, mostly glaucous,* at length much branched and diffuse; *leaves lanceolate* or oblong-lanceolate, serrate, pointed, sessile; heads in very short axillary clusters, or somewhat racemose-panicled on the branches. — Moist rich woodlands; common. Heads rather smaller than in the last.

* * *Racemes terminal, erect, either somewhat simple and wand-like, or compound and panicled, not one-sided: leaves feather-veined.* (*Not maritime.*)

+ *Heads small: leaves nearly entire, except the lowermost.*

5. **S. virgàta,** Michx. *Very smooth* throughout; *stem strict and simple, wand-like* (2° - 4° high), slender, beset with small and entire appressed lanceolate-oblong leaves, which are gradually reduced upwards to mere bracts; the lowest oblong-spatulate, all thickish and smooth; *heads crowded in a very narrow compound spicate receme;* rays 5 - 7. — Damp pine barrens, New Jersey to Virginia and southward.

6. **S. pubérula,** Nutt. *Stem* (1° - 3° high, simple or branched) *and panicle very minutely hoary; stem-leaves lanceolate, acute, tapering to the base,* smoothish; the lower wedge-lanceolate and *sparingly toothed; heads* very nu-

merous, *crowded in compact erect-spreading short racemes, forming a prolonged and dense* narrow or pyramidal *panicle; scales of the involucre linear-awl-shaped,* appressed; rays about 10. — Sandy soil, Maine to Virginia and southward, near the coast.

7. **S. stricta,** Ait. *Very smooth* throughout; stem simple, strict (2°–3° high); *leaves lanceolate,* pointed, the lower tapering gradually into winged petioles, partly sheathing at the base, minutely serrate above with appressed teeth; *racemes much crowded and appressed in a dense wand-like panicle;* scales of the involucre linear-oblong, obtuse; rays 5–6, small. — Peat-bogs, Maine to Wisconsin and northward. Root-leaves 6′–10′ long. It flowers earlier than its allies, beginning in July.

+ + *Heads rather large, at least for the size of the plant.*

8. **S. speciòsa,** Nutt. Stem stout (3°–6° high), smooth; *leaves thickish, smooth* with rough margins, *oval or ovate,* slightly serrate, the uppermost oblong-lanceolate, the lower contracted into a margined petiole; *heads* somewhat crowded *in numerous erect racemes, forming an ample pyramidal or thyrsiform panicle;* peduncles and pedicels rough-hairy; scales of the cylindrical involucre oblong, obtuse; rays about 5, large. — Var. ANGUSTÀTA is a dwarf form, with the racemes short and clustered, forming a dense interrupted or compound spike. — Copses, Massachusetts to Wisconsin and southward. — A very handsome species; the lower leaves 4′–6′ long and 2′–4′ wide in the larger forms.

9. **S. Virga-aùrea,** L. Pubescent or nearly glabrous; *stem low* (6′–18′ high) and *simple; leaves lanceolate or oblanceolate, or the lowest spatulate or elliptical-obovate* and petioled, *serrate with small appressed teeth* or nearly entire; racemes thyrsoid or simple, narrow; scales of the involucre lanceolate or linear, acute; rays 8–12. — An extremely variable species in the Old World and in our northern regions. (Eu.)

Var. **alpìna,** Bigel. Dwarf (1′–8′ high), with few (1–12) pretty large heads (3″–4″ long, becoming smaller as they increase in number); leaves thickish, mostly smooth; scales of the involucre lanceolate, acute or acutish; rays about 12. — Alpine region of the mountains of Maine, New Hampshire, and New York; and shore of Lake Superior.

Var. **hùmilis.** Low (6′–12′ high) and smooth, bearing several or numerous loosely thyrsoid smaller heads, which, with the peduncles, &c., are mostly somewhat glutinous; scales of the involucre obtuse; rays 6–8, short; leaves varying from narrowly lanceolate and nearly entire to oblanceolate and serrate. (S. humilis, *Pursh, Torr. & Gr.*) — Rocky banks, W. Vermont, Lakes Huron and Superior, and northward. At the base of the White Mountains of New Hampshire, on gravelly banks of streams, occurs a form, with the minutely pubescent stout stem 1°–2° high, the leaves larger and broader, and the heads very numerous in an ample compound raceme; the rays occasionally almost white.

10. **S. thyrsoìdea,** E. Meyer. *Stem stout* (1°–4° high), *wand-like,* pubescent near the summit, simple; *leaves thin, ovate, irregularly and coarsely serrate with sharp salient teeth, large* (1′–4′ long), all but the uppermost abruptly contracted into *long and margined petioles; heads large* (5″–6″ long), many-

flowered, crowded in an oblong or wand-like raceme or contracted panicle (2′ - 18′ long); scales of the involucre loose and thin, long, lanceolate, taper-pointed; rays 8 - 10, elongated; achenia smooth. (S. Virga-aurea, *Pursh.* S. leiocarpa, *DC.*) —Wooded sides of high mountains of Maine to New York (south to the Catskills), shore of Lake Superior, and northward.

* * * *Heads in a compound corymb terminating the simple stem, showy: leaves thickish, mostly feather-veined from a strong midrib.*

11. **S. rígida,** L. *Rough and somewhat hoary* with a minute pubescence; stem stout (3° - 5° high), very leafy; the short compact clusters densely corymbed at the summit; *leaves oval or oblong,* the upper closely sessile by a broad base, slightly serrate, the uppermost entire, veiny, thick and rigid; heads large, about 34-flowered; the rays 7 - 10. — Dry soil, Connecticut to Wisconsin and southward.

12. **S. Ohioénsis,** Riddell. *Very smooth* throughout; stem wand-like, slender, leafy (2° - 3° high); *stem-leaves oblong-lanceolate, flat,* entire, closely sessile, the lower and radical ones elongated, slightly serrate towards the apex, somewhat veiny, tapering into long margined petioles; heads numerous in a flat-topped compound corymb, on smooth pedicels, 16 - 20-flowered; the rays 6 or 7. — Moist meadows or prairies, W. New York to Ohio and Wisconsin. — Root-leaves 1° long; the upper reduced to 1′ - 2′, with rough margins, like the rest. Heads smaller than in any other of this section, scarcely one third the size of those of No. 11.

13. **S. Riddéllii,** Frank. *Smooth and stout* (2° - 4° high), *very leafy,* the branches of the dense corymb and pedicels rough-pubescent; *leaves linear-lanceolate, elongated* (4′ - 6′ long), entire, acute, partly clasping or sheathing, *conduplicate and mostly recurved,* the lowest elongated-lanceolate and tapering into a long keeled petiole, obscurely 3-nerved; *heads very numerous* in close clusters, aggregated in a spreading flat-topped compound corymb, 20 - 24-flowered; the rays 7 - 9. — Wet grassy prairies, Ohio to Wisconsin, and Illinois. — Heads larger than in the last, 2″ - 3″ long. Stem-leaves upright and partly sheathing at the base, then gradually recurved-spreading.

14. **S. Houghtònii,** Torr. & Gray, ined. *Smooth; stem rather low and slender* (1° - 1½° high); *leaves scattered, linear-lanceolate, acutish, flat,* entire, tapering into a narrowed slightly clasping base, or the lower into margined petioles; *heads several,* crowded in a small nearly simple corymb, 20 - 30-flowered; the rays 9 or 10. — North shore of Lake Michigan; collected in the Michigan State Survey. Aug. — Leaves smooth, but not shining, rough-margined, 3′ - 5 long, 1-nerved, or the lower very obscurely 3-nerved above. Corymb minutely pubescent. Heads large, nearly ½′ long. Scales of the involucre obtuse, minutely ciliate.

* * * * *Heads in one-sided more or less spreading or recurved racemes: leaves veiny, not 3-ribbed, but sometimes obscurely triple-nerved.*

+ *Leaves thickish, very smooth, entire, elongated, obscurely veiny: heads rather large.*

15. **S. sempérvirens,** L. Smooth and stout (1° - 8° high); leaves fleshy, lanceolate, slightly clasping, or the lower lanceolate-oblong, obscurely triple-nerved; racemes short, in an open or contracted panicle. — Varies, in less

brackish swamps, with thinner and elongated linear-lanceolate leaves, tapering to each end, with more erect racemes in a narrower panicle. — Salt marshes, or rocks on the shore, Maine to Virginia. — Heads showy: the golden rays 8 – 10.

+ + *Leaves usually ample, serrate, loosely feather-veined, or rarely slightly triple-nerved; heads middle-sized.*

16. **S. elliptica,** Ait. *Smooth;* stem stout (1° – 3° high), *very leafy; leaves elliptical or oblong-lanceolate,* acute (2′ – 3′ long), closely sessile, slightly serrate, strongly veined, *thick, smooth both sides, shining above; heads in dense spreading racemes which are crowded in a close pyramidal panicle;* peduncles and achenia strigose-pubescent. — Swamps (fresh or brackish) near the coast, New Jersey, *Carey.* Rhode Island, *Olney.* Sept., Oct. — Heads showy, 3″ long; the rays 8 – 12.

17. **S. neglécta,** Torr. & Gray. *Smooth;* stem stout (2° – 3° high); *leaves thickish, smooth both sides, opaque; the upper oblong-lanceolate,* mostly acute and nearly entire; the *lower ovate-lanceolate or oblong,* sharply serrate, tapering into a petiole; *racemes short and dense, at length spreading,* disposed in an elongated or pyramidal close panicle; peduncles and achenia nearly glabrous. — Swamps, Maine to Penn. and Wisconsin. — Heads rather large, crowded; the racemes at first erect and scarcely one-sided.

18. **S. pátula,** Muhl. *Stem strongly angled, smooth* (3° – 5° high); *leaves* (4′ – 8′ long) *ovate,* acute, serrate, pale, *very smooth and veiny underneath,* but the *upper surface very rough,* like shagreen; racemes rather short and numerous on the spreading branches. — Swamps; common.

19. **S. argùta,** Ait. *Smooth throughout* (1° – 4° high); *radical and lower stem-leaves elliptical or lanceolate-oval, sharply serrate* with spreading teeth, *pointed,* tapering into winged and ciliate petioles; *the others lanceolate or oblong,* slightly triple-nerved, tapering to each end, the *uppermost entire; racemes dense, naked, at length elongated and recurved, forming a crowded and flat corymb-like panicle; rays* 8 – 12, *small.* — Var. 1. JÚNCEA has the leaves narrower and less serrate, or all the upper entire. — Var. 2. SCABRÉLLA is somewhat roughish-pubescent (Wisconsin, &c.). — Copses and banks, common, especially the first variety. — Well distinguished by its long or drooping racemes, and the closely appressed rigid scales of the involucre, small rays, &c. But the name is a bad one, as even the root-leaves are seldom very sharply toothed.

20. **S. Muhlenbérgii,** Torr. & Gr. *Smooth; stem angled; leaves* (large and thin) *ovate,* and the upper elliptical-lanceolate, *very sharply and strongly serrate, pointed at both ends,* the lowest on margined petioles; *racemes pubescent, spreading, disposed in an elongated open panicle; rays* 6 – 7, *large.* — Copses and moist woods, Massachusetts to Penn. — Racemes much shorter and looser than in the last; the involucral scales thin and more slender.

21. **S. linoìdes,** Solander. *Smooth; stem slender, simple* (10′ – 20′ high); *leaves lanceolate,* serrate with small appressed teeth, narrowed at the base, the lower tapering into margined ciliate petioles, the uppermost oblong; *racemes short, crowded in one or* 3 – 4 *small one-sided panicles* (3′ – 4′ long); heads small and few-flowered; *rays* 1 – 3. — Bogs, New England (near Boston and Providence), to the pine barrens of New Jersey.

+ + + *Leaves broad, not large, sessile or short-petioled, coarsely and sharply serrate, copiously feather-veined; veinlets conspicuously reticulated: heads small: rays short.*

22. **S. altíssima,** L. *Rough-hairy, especially the stem* (2° – 7° high); *leaves ovate-lanceolate, elliptical or oblong, often thickish and very rugose;* racemes panicled, spreading; scales of the involucre linear; rays 6 – 9; the disk-flowers 4 – 7. — Borders of fields and copses; very common, presenting a great variety of forms: but instead of the tallest, as its name denotes, it is usually one of the lowest of the common *Golden-rods.*

23. **S. ulmifòlia,** Muhl. *Stem smooth,* the branches hairy; *leaves thin, elliptical-ovate or oblong-lanceolate,* pointed, *tapering to the base,* loosely veined, beset with soft hairs beneath; racemes panicled, recurved-spreading; scales of the involucre lanceolate-oblong; rays about 4. — Low copses; common. — Too near the last; distinguished only by its smooth stem and thin larger leaves.

24. **S. Drummóndii,** Torr. & Gr. *Stem* (1° – 3° high) *and lower surface of the broadly ovate or oval somewhat triple-ribbed leaves minutely velvety-pubescent,* some of the leaves almost entire; racemes panicled, short; scales of the involucre oblong, obtuse; rays 4 or 5. — Rocks, Illinois opposite St. Louis, and southwestward.

+ + + + *Leaves entire or nearly so, thickish, reticulate-veiny, but the veins obscure.*

25. **S. pilòsa,** Walt. *Stem stout, upright* (3° – 7° high), *clothed with spreading hairs,* often panicled at the summit; *leaves oblong-lanceolate, roughish, hairy beneath,* at least on the midrib, serrulate, the upper ovate-lanceolate or oblong and entire, closely sessile; racemes many, recurved, crowded in a dense pyramidal panicle; rays 7 – 10, very short. — Low grounds, pine barrens of New Jersey to Virginia, and southward.

26. **S. odòra,** Ait. (Sweet Golden-rod.) *Smooth* or nearly so throughout; *stem slender* (2° – 3° high), *often reclined; leaves linear-lanceolate, entire,* shining, *pellucid-dotted;* racemes spreading in a small one-sided panicle; rays 3 – 4, rather large. — Border of thickets in dry or sandy soil, Vermont and Maine to Kentucky, and southward. — The crushed leaves yield a pleasant anisate odor.

+ + + + + *Leaves grayish or hoary, thickish, feather-veined and slightly triple-nerved, obscurely serrate or entire; heads middle-sized.*

27. **S. nemoràlis,** Ait. *Clothed with a minute and close grayish-hoary* (soft or roughish) *pubescence;* stem, simple or corymbed at the summit (½° – 2½° high); leaves oblanceolate or spatulate-oblong, the lower somewhat crenate-toothed and tapering into a petiole; racemes numerous, dense, at length recurved, forming a large and crowded compound raceme or panicle which is usually turned to one side; scales of the involucre linear-oblong, appressed; rays 6 – 9. — Dry sterile fields; very common. In the West occur less hoary and rougher forms.

* * * * * *Heads in one-sided spreading or recurved racemes, forming an ample panicle: leaves plainly 3-ribbed, or triple-ribbed.*

+ *Scales of the involucre thickish and rigid, closely imbricated, with somewhat greenish tips or midrib: leaves rigid, smooth and shining.*

28. **S. Shórtii,** Torr. & Gr. Stem slender, simple (1° – 3° high), minutely roughish-pubescent; *leaves oblong-lanceolate,* acute, the lower sharply serrate

above the middle with scattered fine teeth; racemes mostly short in a crowded panicle; *achenia silky-pubescent.* — Rocks, at the Falls of the Ohio, &c. — A handsome species: heads 3″ long, narrow.

29. **S. Missouriénsis,** Nutt. Smooth throughout (1° - 3° high); *leaves linear-lanceolate,* or the lower broadly lanceolate, tapering to both ends, with very rough margins, the *lower very sharply serrate;* heads and dense crowded racemes nearly as in No. 19; *achenia nearly glabrous.* — Dry prairies, from Illinois southward and westward. — Heads 1½″ - 2″ long.

+- +- *Scales of the involucre narrow, thin and membranaceous: racemes mostly elongated and numerous, forming a crowded ample panicle.* (These all present intermediate forms, and perhaps may be reduced to one polymorphous species.)

30. **S. rupéstris,** Raf. *Stem smooth and slender* (2° - 3° high); *leaves linear-lanceolate, tapering to both ends, smooth and glabrous, entire,* or nearly so; panicle narrow; *heads very small; rays very short.* — Rocky river-banks, Kentucky and Indiana.

31. **S. Canadénsis,** L. *Stem rough-hairy,* tall and stout (3° - 6° high); *leaves lanceolate,* pointed, sharply serrate (sometimes almost entire), *more or less pubescent beneath and rough above; heads small; rays very short.* — Borders of thickets and fields; very common. — Varies greatly in the roughness and hairiness of the stem and leaves, the latter oblong-lanceolate or elongated linear-lanceolate; — in var. PRÒCERA, whitish-woolly underneath; and in var. SCÀBRA also very rough above, often entire, and rugose-veined.

32. **S. serótina,** Ait. *Stem very smooth,* tall and stout (4° - 8° high), often glaucous; *leaves* lanceolate, pointed, serrate, *roughish above, smooth except the veins underneath, which are more or less hairy; rays short.* — Thickets and low grounds; common. — Intermediate in character, and in the size of the heads and rays, between the last and the next.

33. **S. gigántea,** Ait. *Stem* stout (3° - 7° high), *smooth, often glaucous; leaves quite smooth both sides,* lanceolate, taper-pointed, very sharply serrate, except the narrowed base, rough-ciliate; the ample panicle pubescent; *rays rather long.* — Copses and fence-rows; common: — presenting many varieties, but with decidedly larger heads and rays than in the preceding. Seldom very tall.

§ 4. EUTHÁMIA, Nutt. — *Corymbosely much branched: heads small, sessile in little clusters which are crowded in flat-topped corymbs; the closely appressed scales of the involucre somewhat glutinous: receptacle fimbrillate: rays* 6 - 20, *short, more numerous than the disk-flowers: leaves narrow, entire, sessile, crowded.*

34. **S. lanceolàta,** L. *Leaves lanceolate-linear,* 3 - 5-*nerved,* the nerves, margins, and angles of the branches minutely rough-pubescent; heads obovoid-cylindrical, in dense corymbed clusters; *rays* 15 - 20. — River-banks, &c. in moist soil; common. — Stem 2° - 4° high: leaves 3′ - 5′ long.

35. **S. tenuifòlia,** Pursh. Smooth, slender; *leaves very narrowly linear, mostly* 1-*nerved, dotted;* heads obovoid-club-shaped, in numerous clusters of 2 or 3, disposed in a loose corymb; *rays* 6 - 12. — Sandy fields, Massachusetts to Illinois, and southward; common near the coast.

20. BIGELÒVIA, DC. Rayless Golden-rod

Heads 3-4-flowered, the flowers all perfect and tubular: rays none. Involucre club-shaped, yellowish; the rigid somewhat glutinous scales linear, closely imbricated and appressed. Receptacle narrow, with an awl-shaped prolongation in the centre. Achenia somewhat obconical, hairy. Pappus a single row of capillary bristles. — A perennial smooth herb; the slender stem (1°-2° high) simple or branched from the base, naked above, corymbose at the summit, bearing small heads in a flat-topped corymb. Flowers yellow. Leaves scattered, oblanceolate or linear, 1-3-nerved. (Dedicated by De Candolle to *Dr. Jacob Bigelow*, author of the Florula Bostoniensis, and of the American Medical Botany.)

1. **B. nudàta,** DC.—Low pine barrens, New Jersey and southward. Sept.

21. CHRYSÓPSIS, Nutt. Golden Aster.

Heads many-flowered, radiate; the rays numerous, pistillate. Scales of the involucre linear, imbricated, without herbaceous tips. Receptacle flat. Achenia obovate or linear-oblong, flattened, hairy. Pappus of all the flowers double, the outer a set of very short and somewhat chaffy bristles, the inner of elongated capillary bristles. — Chiefly perennial low herbs, woolly or hairy, with rather large often corymbose heads terminating the branches. Disk and ray-flowers yellow. (Name composed of χρυσός, *gold*, and ὄψις, *aspect*, from the golden blossoms.)

* *Leaves narrowly lanceolate or linear: achenia linear.*

1. **C. graminifòlia,** Nutt. *Silvery-silky* with long close-pressed hairs; stem slender, naked above, the few heads closely corymbed; *leaves lanceolate or linear, elongated, grass-like, nerved, shining,* entire. — Dry sandy soil, Delaware to Virginia, and southward. July-Oct.

2. **C. falcàta,** Ell. *Stems* (4′-10′ high) very woolly; *leaves crowded, linear, rigid, about 3-nerved,* entire, *somewhat recurved or scythe-shaped, hairy,* or smooth when old, sessile; heads (small) corymbed. — Dry sandy soil on the coast, pine barrens of New Jersey to Nantucket, Massachusetts. Aug.

* * *Leaves oblong or lanceolate, entire or slightly serrate, mostly sessile, veined, not nerved; achenia obovate, flattened.*

3. **C. gossýpina,** Nutt. *Densely woolly all over; leaves oblong, obtuse,* (1′-2′ long); heads larger than in the next. — Pine barrens, Virginia and southward. Aug.-Oct.

4. **C. Mariàna,** Nutt. *Silky with long and weak hairs,* or when old smoothish; *leaves oblong;* heads corymbed, on glandular peduncles. — Dry barrens, from New York southward, near the coast. Aug.-Oct.

5. **C. villòsa,** Nutt. *Hirsute and villous-pubescent;* stem corymbosely branched, the branches terminated by single short-peduncled heads; *leaves narrowly oblong, hoary with rough pubescence* (as also the involucre), *bristly-ciliate* toward the base. — Dry plains and prairies, Wisconsin to Kentucky, and westward. July-Sept.

22. ÍNULA, L. ELECAMPANE.

Outer scales of the involucre sometimes leaf-like. Achenia terete or 4-sided. Pappus simple, of capillary bristles. Anthers with 2 tails at their base. Otherwise much as in the last genus. (The ancient Latin name.)

1. **I. Helènium**, L. (COMMON ELECAMPANE.) Stout (3° - 5° high); leaves large, woolly beneath; those from the thick root ovate, petioled, the others partly clasping; rays very many, narrow. ♃ — Road-sides, escaped from cultivation. Aug. — Heads very large. Root mucilaginous. (Adv. from Eu.)

23. PLÙCHEA, Cass. MARSH FLEABANE.

Heads many-flowered; the flowers all tubular; the central perfect, but sterile, few, with a 5-cleft corolla; all the others with a thread-shaped truncate corolla, pistillate and fertile. Involucre imbricated. Anthers with tails. Achenia grooved. Pappus capillary, in a single row. — Herbs, somewhat glandular, emitting a strong and disagreeable or camphoric odor, the heads in close compound corymbs. Flowers purplish. (Dedicated to the Abbé *Pluche*.)

1. **P. camphoràta,** DC. (SALT-MARSH FLEABANE.) *Minutely viscid, pale* (1° - 2° high); *leaves scarcely petioled,* oblong-ovate or lanceolate, thickish, obscurely veiny, serrate; corymb flat; involucre viscid-downy. ① (Conyza camphorata, *Bigel.* C. Marylándica, *Pursh.*) — Salt marshes, Massachusetts to Virginia and southward. Aug.

2. **P. fœ́tida,** DC. *Almost smooth* (2° - 4° high); *leaves distinctly petioled, veiny,* oval-lanceolate, pointed at both ends, serrate; corymbs panicled; involucre smooth. ♃ — River-banks, Ohio to Illinois, and southward. Aug.

24. BÁCCHARIS, L. GROUNDSEL-TREE.

Heads many-flowered; the flowers all tubular, diœcious, viz. the pistillate and staminate flowers in separate heads borne by different plants. Involucre imbricated. Corolla of the pistillate flowers very slender and thread-like; of the staminate, larger and 5-lobed. Anthers tailless. Achenia ribbed. Pappus of slender capillary bristles, in the sterile plant scanty and tortuous; in the fertile plant very long and copious. — Shrubs, commonly smooth and resinous or glutinous. Flowers whitish or yellow. (The name of some shrub anciently dedicated to *Bacchus*.)

1. **B. halimifòlia,** L. (SEA GROUNDSEL-TREE.) Smooth and somewhat scurfy; branches angled; leaves obovate and wedge-form, coarsely toothed, or the upper entire; heads scattered or in leafy panicles; scales of the involucre acutish. — Sea-beach, Connecticut to Virginia, and southward. Sept. - Oct. — Shrub 6° - 12° high; the fertile plant conspicuous in autumn by its very long and white pappus.

2. **B. glomeruliflòra,** Pers. Leaves spatulate-oblong; heads larger, sessile in the axils or in clusters; scales of the bell-shaped involucre broader and very obtuse: otherwise like the last. — Pine barrens, Virginia near the coast, and southward.

25. POLÝMNIA, L. LEAF-CUP.

Heads many-flowered, radiate; the rays several, pistillate and fertile; the disk-flowers perfect, but sterile. Scales of the involucre in two rows; the outer about 5, leaf-like, large and spreading; the inner small and membranaceous, partly embracing the thickened round-obovoid achenia. Receptacle flat, with a membranaceous chaff to each flower. Pappus none. — Tall branching perennial herbs, viscid-hairy, exhaling a heavy odor. Leaves large and thin, opposite, or the uppermost alternate, lobed, and with dilated appendages like stipules at the base. Heads in panicled corymbs. Flowers light yellow. (Dedicated to one of the Muses, for no imaginable reason, as the plants are coarse and inelegant.)

1. **P. Canadénsis,** L. *Clammy-hairy;* lower leaves deeply pinnatifid, the uppermost triangular-ovate and 3 - 5-lobed or angled, petioled; *rays few, obovate or wedge-form, shorter than the involucre,* whitish-yellow. — Moist shaded ravines, W. New York to Wisconsin, and southward along the mountains. July - Sept.

2. **P. Uvedàlia,** L. *Roughish-hairy, stout* (4° - 10° high); leaves broadly ovate, angled and toothed, nearly sessile; the lower palmately lobed, abruptly narrowed into a winged petiole; outer involucral scales very large; *rays* 10 - 15, *linear-oblong, much longer than the inner scales of the involucre,* yellow. — Rich soil, W. New York to Illinois and southward. Aug.

26. CHRYSÓGONUM, L. CHRYSOGONUM.

Heads many-flowered, radiate; the rays about 5, pistillate and fertile; the disk-flowers perfect but sterile. Involucre of about 5 exterior leaf-like oblong scales, which exceed the disk, and as many interior shorter and chaff-like concave scales. Receptacle flat, with a linear chaff to each disk-flower. Achenia all in the ray, obovate, obcompressed, 4-angled, each one partly enclosed by the short scale of the involucre behind it; those of the disk-flowers abortive. Pappus a small chaffy crown, 2 - 3-toothed, and split down the inner side. — A low (2′ - 6′ high), hairy, perennial herb, nearly stemless when it begins to flower, the flowerless shoots forming runners. Leaves opposite, ovate or spatulate, crenate, long-petioled. Heads single, long-peduncled. Flowers yellow. (Name composed of *χρυσός, golden*, and *γόνυ, knee.*)

1. **C. Virginiànum,** L. Dry soil, from Pennsylvania (Mercersburg, *Porter*) and Illinois southward. May - Aug. — Rays ½′ long.

27. SÍLPHIUM, L. ROSIN-PLANT.

Heads many-flowered, radiate; the rays numerous, pistillate and fertile, their broad flat ovaries imbricated in 2 or 3 rows; the disk-flowers perfect, but sterile. Scales of the broad and flattish involucre imbricated in several rows, broad and with loose leaf-like summits, except the innermost, which are small and resemble the linear chaff of the flat receptacle. Achenia broad and flat, obcompressed, surrounded by a wing which is notched at the top, destitute of pappus, or with 2 teeth confluent with the winged margin: achenia of the disk sterile and stalk like. — Coarse and tall rough perennial herbs, with a copious resinous juice, and large corymbose-panicled yellow-flowered heads. (Σίλφιον, the ancient name of a plant which produced some gum-resin (assafœtida?), was transferred by Linnæus to this American genus.)

* *Stem terete, naked above, alternate-leaved near the base (root very large and thick).*

1. **S. laciniàtum,** L. (Rosin-weed. Compass-Plant.) *Very rough-bristly throughout;* stem stout (3° – 6° high); *leaves pinnately parted,* petioled but dilated and clasping at the base; *their divisions lanceolate or linear,* acute, *cut-lobed or pinnatifid,* rarely entire; heads few (1′ – 2′ broad), somewhat racemed; *scales of the involucre ovate, tapering into long and spreading rigid points;* achenia broadly winged and deeply notched. — Prairies, Michigan and Wisconsin, thence southward and westward. July. Lower leaves 12′ – 30′ long, ovate in outline; on the wide open prairies, said to present their edges uniformly north and south, and hence called *Compass-Plant.*

2. **S. terebinthinàceum,** L. (Prairie Dock.) *Stem smooth, slender* (4° – 10° high), panicled at the summit and bearing many (small) heads, leafless except towards the base; *leaves ovate* and ovate-oblong, somewhat heart-shaped, *serrate-toothed,* thick, rough, especially beneath (1° – 2° long, and on slender petioles); *scales of the involucre roundish, obtuse,* smooth; achenia narrowly winged, slightly notched and 2-toothed. — Var. pinnatífidum has the leaves deeply cut or pinnatifid, but varies into the ordinary form. — Prairies and oak-openings, Ohio to Wisconsin and southward. July – Sept.

* * *Stem terete or slightly 4-angled, leafy: leaves undivided (not large).*

3. **S. trifoliàtum,** L. *Stem smooth, often glaucous,* rather slender (4° – 6° high), branched above, stem-*leaves lanceolate, pointed, entire* or scarcely serrate, rough, *short-petioled, in whorls of* 3 *or* 4, the uppermost opposite; heads loosely panicled; achenia rather broadly winged, and sharply 2-toothed at the top. — Dry plains and banks, W. New York to Wisconsin and southward. Aug.

4. **S. Asteriscus,** L. *Stem hispid* (2° – 4° high); *leaves opposite, or the lower in whorls of* 3, *the upper alternate, oblong or oval-lanceolate, coarsely toothed,* rarely entire, *rough-hairy,* the upper sessile; heads nearly solitary (large); achenia obovate, winged and 2-toothed. — Dry sandy soil, Virginia and southward.

5. **S. integrifòlium,** Michx. *Stem rough,* rather stout (2° – 4° high), rigid, 4-angular and grooved; *leaves all opposite, rigid, lanceolate-ovate,* entire, tapering to a sharp point *from a roundish heart-shaped and partly clasping base,* rough-pubescent or nearly smooth, thick (3′ – 5′ long); heads in a close forking corymb, short-peduncled; achenia broadly winged and deeply notched. — Var. læve has the stem and leaves smooth or nearly so. — Prairies, Michigan to Wisconsin, and southward. Aug.

* * * *Stem square: leaves opposite, connate (thin and large, 6′ – 15′ long).*

6. **S. perfoliàtum,** L. (Cup-Plant.) Stem stout, often branched above (4° – 8° high); leaves ovate, coarsely toothed, the upper united by their bases and forming a cup-shaped disk, the lower abruptly narrowed into winged petioles which are connate by their bases; heads corymbose; achenia winged and variously notched. — Rich soil along streams, Michigan to Wisconsin, and southward; common. July.

28. PARTHÈNIUM, L. PARTHENIUM.

Heads many-flowered, inconspicuously radiate; the 5 ray-flowers with very short and broad obcordate ligules not projecting beyond the woolly disk, pistillate and fertile; the disk-flowers staminate with imperfect styles, sterile. Involucre hemispherical, of 2 ranks of short ovate or roundish scales. Receptacle conical, chaffy. Achenia only in the ray, obcompressed, surrounded by a slender callous margin, crowned with the persistent ray-corolla and a pappus of 2 small chaffy scales. — Leaves alternate. Heads small, corymbed; the flowers whitish. (An ancient name of some plant, from παρθένος, *virgin*.)

1. **P. integrifòlium,** L. Rough-pubescent (1° – 3° high); leaves oblong or ovate, crenate-toothed, or the lower (3′ – 6′ long) cut-lobed below the middle; heads many, in a dense flat corymb. ♃ — Dry soil, Maryland to Wisconsin, and southward.

29. ÌVA, L. MARSH ELDER. HIGHWATER-SHRUB.

Heads several-flowered, not radiate; the pistillate fertile and the staminate sterile flowers in the same heads, the former few (1 – 5) and marginal, with a small tubular corolla; the latter with a funnel-form 5-toothed corolla. Scales of the involucre few, roundish. Receptacle small, with narrow chaff among the flowers. Achenia obovoid or lenticular. Pappus none. — Herbaceous or shrubby coarse plants, with thickish leaves, the lower opposite, and small greenish-white heads on short recurved peduncles in the axils of the leaves or of bracts. (Derivation unknown.)

1. **I. frutéscens,** L. *Shrubby at the base, nearly smooth* (3° – 8° high); leaves oval or lanceolate, coarsely and sharply toothed, rather fleshy, the upper reduced to linear bracts, in the axils of which the heads are disposed, forming leafy panicled racemes; fertile flowers and scales of the involucre 5. — Salt marshes, coast of Massachusetts to Virginia, and southward. Aug.

2. **I. ciliàta,** Willd. *Annual* (2° – 8° high), *rough and hairy; leaves* ovate, pointed, coarsely toothed, *downy beneath, on slender ciliate petioles;* heads in dense panicled spikes, with conspicuous ovate-lanceolate rough-ciliate bracts; scales of the involucre and fertile flowers 3 – 5. — Moist ground, from Illinois southward. Aug. – Oct.

30. AMBRÒSIA, Tourn. RAGWEED.

Sterile and fertile flowers occupying different heads on the same plant; the fertile 1 – 3 together and sessile in the axil of leaves or bracts, at the base of the racemes or spikes of sterile heads. Sterile involucres flattish or top-shaped, composed of 7 – 12 scales united into a cup, containing 5 – 20 funnel-form staminate flowers; with slender chaff intermixed, or none. Fertile involucre (fruit) oblong or top-shaped, closed, pointed, and usually with 4 – 8 tubercles or horns near the top in one row, enclosing a single flower which is composed of a pistil only; the elongated branches of the style protruding. Achenia ovoid: pappus none. — Chiefly annual coarse weeds, with opposite or alternate lobed or dissected leaves, and inconspicuous greenish or whitish flowers. (*'Αμβροσία, the food of the gods*, an ill-chosen name for these worthless and coarse weeds.)

§ 1. *Sterile heads sessile, crowded in a dense cylindrical spike, the top-shaped involucre with the truncate margin extended on one side into a large, lanceolate, hooded, recurved, bristly-hairy tooth or appendage; fertile involucre oblong and 4-angled.*

1. **A. bidentàta,** Michx. Hairy (1° – 3° high), very leafy; leaves alternate, lanceolate, partly clasping, nearly entire, except a short lobe or tooth on each side near the base. ① — Prairies of Illinois and southward. Aug.

§ 2. *Sterile heads in single or panicled racemes or spikes, the involucre regular.*

* *Leaves opposite, only lobed: sterile involucre 3-ribbed on one side.*

2. **A. trífida,** L. (GREAT RAGWEED.) Stem square, stout (4° – 12° high), rough-hairy, as are the large deeply 3-lobed leaves, the lobes oval-lanceolate and serrate; petioles margined; fruit obovate, 6-ribbed and tubercled. ① — Var. INTEGRIFÒLIA is only a smaller form, with the upper leaves or all of them undivided, ovate or oval. — Moist river-banks; common. Aug.

* * *Leaves many of them alternate, once or twice pinnatifid.*

3. **A. artemisiæfòlia,** L. (ROMAN WORMWOOD. HOG-WEED. BITTER-WEED.) Much branched (1° – 3° high), hairy or roughish-pubescent; *leaves thin, twice-pinnatifid*, smoothish above, paler or hoary beneath; *fruit* obovoid or globular, *armed with about 6 short acute teeth or spines.* ① — Waste places everywhere. July – Sept. — An extremely variable weed, with finely cut leaves, embracing several nominal species.

4. **A. psilostàchya,** DC. Paniculate-branched (2° – 5° high), rough and somewhat hoary with short hispid hairs; *leaves once pinnatifid, thickish*, the lobes acute, those of the lower leaves often incised; *fruit* obovoid, *without tubercles or with very small ones*, pubescent. ① (A. coronopifòlia, *Torr. & Gr.*) - Prairies and plains, Illinois and southwestward. Aug.

81. XÁNTHIUM, Tourn. COCKLEBUR. CLOTBUR.

Sterile and fertile flowers occupying different heads on the same plant; the latter clustered below, the former in short spikes or racemes above. Sterile involucres and flowers as in Ambrosia, but the scales separate. Fertile involucre closed, coriaceous, ovoid or oblong, clothed with hooked prickles so as to form a rough bur, 2-celled, 2-flowered; the flowers consisting of a pistil with a slender thread-form corolla. Achenia oblong, flat; destitute of pappus. — Coarse and vile weeds, with annual roots, low and branching stout stems, and alternate toothed or lobed petioled leaves. (Name from ξάνθος, *yellow*, in allusion to the color the plants are said to yield.)

1. **X. strumàrium,** L. (COMMON COCKLEBUR.) Rough; *stems unarmed; leaves dilated-triangular and more or less heart-shaped*, on long petioles, toothed and cut or obscurely lobed; fruit oval or oblong (½′ – ¾′ long), pubescent on the lower part of and between the hooked prickles, and with two strong and usually straight *beaks at the summit.* — Barn-yards, &c. (Nat. from Eu) — Varies into forms with more spotted stems, and often larger fruit (¾′ – 1′ long),

which is either glabrous, glandular, or glandular hairy, the prickles longer, and the beaks often incurved. (X. Canadense, *Mill.*, &c.) — River-banks, &c., common westward; apparently indigenous. And this passes into

Var. **echinàtum.** (X. echinatum, *Murr.*, &c.) Fruit turgid (1′ long), thickly clothed with long prickles, glandular-hispid, the beaks commonly incurved. — Sandy sea-shore, and along the Great Lakes and rivers. Perhaps an immigrant from farther south. Now scattered over the warm parts of the world.

2. **X. spinòsum,** L. (THORNY CLOTBUR.) Hoary-pubescent; stems slender, with slender yellow *3-parted spines at the base of the lanceolate or ovate-lanceolate leaves;* these taper into a short petiole, are white-downy beneath, often 2 – 3-lobed or cut; fruit (½′ long) pointed with *a single short beak.* — Waste places on the sea-board. Sept. – Nov. (Nat. from Trop. Amer.?)

32. TETRAGONOTHÈCA, Dill. TETRAGONOTHECA.

Heads many-flowered, radiate; the rays 6 – 9, fertile. Involucre double; the outer of 4 large and leafy ovate scales, which are united below by their margins into a 4-angled or winged cup; the inner of as many small and chaffy scales as there are ray-flowers, and partly clasping their achenia. Receptacle convex or conical, with narrow and membranaceous chaff between the flowers. Achenia roundish and obovoid, flat at the top. Pappus none. — An erect perennial herb, viscidly hairy when young, with opposite and coarsely toothed oval or oblong leaves, their sessile bases sometimes connate, and large single heads of pale yellow flowers, on terminal peduncles. (Name compounded of τετράγωνος, *four-angled*, and θήκη, *a case*, from the shape of the involucre.)

1. **T. helianthoides,** L. — Sandy soil, Virginia and southward. June.

33. ECLÍPTA, L. ECLIPTA.

Heads many-flowered, radiate; the rays short, fertile; the disk-flowers perfect, 4-toothed. Scales of the involucre 10 – 12, in 2 rows, leaf-like, ovate-lanceolate. Receptacle flat, with almost bristle-form chaff between the flowers. Achenia short, 3 – 4-sided, or in the disk laterally flattened, roughened on the sides, hairy at the summit; the pappus none, or an obscure denticulate crown. — Annual or biennial rough herbs, with slender stems and opposite lanceolate or oblong leaves. Heads solitary, small. Flowers whitish: anthers brown. (Name from ἐκλείπω, *to be deficient*, alluding to the absence of pappus.)

1. **E. procúmbens,** Michx. Rough with close appressed hairs; stems procumbent, creeping, or ascending; leaves oblong-lanceolate, acute at each end, sessile, slightly serrate; peduncles many times longer than the head. — Var. BRACHÝPODA has the peduncles not more than twice the length of the heads. — Wet river-banks, Penn. to Illinois, and southward. June – Oct.

34. BORRÍCHIA, Adans. SEA OX-EYE.

Heads many-flowered, radiate; the rays fertile. Scales of the hemispherical involucre imbricated. Receptacle flat, covered with lanceolate rigid and persistent chaff. Achenia somewhat wedge-shaped, 3 – 4-angled. Pappus a short

4-toothed crown.—Shrubby low maritime plants, coriaceous or fleshy, with opposite nearly entire leaves, and solitary peduncled terminal heads of yellow flowers: anthers blackish. (Named for *Olof Borrich*, a Danish botanist.)

1. **B. frutéscens,** DC. Whitened with a minute silky pubescence (6′–12′ high); leaves spatulate-oblong or lanceolate, often toothed near the base; chaff rigidly pointed.—Virginia and southward.

35. HELIÓPSIS, Pers. OX-EYE.

Heads many-flowered, radiate; the rays 10 or more, fertile. Scales of the involucre in 2 or 3 rows; the outer leaf-like and somewhat spreading, the inner shorter than the disk. Receptacle conical: chaff linear. Achenia smooth, 4-angular. Pappus none, or a mere border.—Perennial herbs, like Helianthus. Heads showy, peduncled, terminating the stem or branches. Leaves opposite, petioled, triple-ribed, serrate. Flowers yellow. (Name composed of ἥλιος, *the sun*, and ὄψις, *appearance*, from a resemblance to the Sunflower.)

1. **H. lǽvis,** Pers. Nearly smooth (1°–4° high); leaves ovate-lanceolate or oblong-ovate.—Var. SCÀBRA has roughish foliage, and the involucre somewhat hoary.—Banks and copses; common. Aug.

36. ECHINÀCEA, Mœnch. PURPLE CONE-FLOWER.

Heads many-flowered, radiate; the rays very long, drooping, pistillate but sterile. Scales of the involucre imbricated, lanceolate, spreading. Receptacle conical; the lanceolate chaff tipped with a cartilaginous point, longer than the disk-flowers. Achenia thick and short, 4-sided. Pappus a small toothed border.—Perennial herbs, with the stout and nearly simple stems naked above and terminated by a single large head; the leaves chiefly alternate, 3–5-nerved. Rays rose-purple, rather persistent; disk purplish. (Name formed from Ἐχῖνος, *the Hedgehog*, or *Sea-urchin*, in allusion to the spiny chaff of the disk.)

1. **E. purpùrea,** Mœnch. *Leaves* rough, often serrate; the lowest *ovate, 5-nerved,* veiny, long-petioled; the others *ovate-lanceolate;* involucre imbricated in 3–5 rows; stem smooth, or in one variety (E. serótina, *DC.*) rough-bristly, as well as the leaves.—Prairies and banks, from W. Penn. and Ohio southward and westward. July.—Rays 15–20, dull purple (rarely whitish), 1′–2′ long. Root thick, black, very pungent to the taste, used in popular medicine under the name of *Black Sampson.*

2. **E. angustifòlia,** DC. *Leaves,* as well as the slender simple stem, *bristly-hairy, lanceolate and linear-lanceolate, 3-nerved, entire;* involucre less imbricated; rays 12–15 (2′ long), rose-color or red.—Plains, from Illinois and Wisconsin southwestward. June–Aug.

37. RUDBÉCKIA, L. CONE-FLOWER.

Heads many-flowered, radiate; the rays neutral. Scales of the involucre leaf-like, in about 2 rows, spreading. Receptacle conical or columnar, the short chaff concave, not rigid. Achenia 4-angular, smooth, not margined, flat at the top, with no pappus, or a minute crown-like border. — Chiefly perennial herbs, with alternate leaves, and showy heads terminating the stem or branches; the rays generally long and drooping, yellow. (Named in honor of the *Professors Rudbeck*, father and son, predecessors of Linnæus at Upsal.)

* *Disk columnar in fruit, dull greenish-yellow: leaves divided and cut.*

1. **R. laciniàta,** L. Stem smooth, branching (3°–7° high); leaves smooth or roughish, the lowest pinnate, with 5–7 cut or 3-lobed leaflets; upper leaves irregularly 3–5-parted; the lobes ovate-lanceolate, pointed, or the uppermost undivided; heads long-peduncled; chaff truncate and downy at the tip; rays linear (1′–2′ long), drooping. — Low thickets; common. July–Sept.

* * *Disk globular, pale brownish: lower leaves 3-parted: receptacle sweet-scented.*

2. **R. subtomentòsa,** Pursh. Stem branching above (3°–4° high), downy, as well as the lower side of the ovate or ovate-lanceolate serrate leaves; heads short-peduncled; chaff downy at the blunt apex. — Prairies, Wisconsin, Illinois, and southward.

* * * *Disk broadly conical, dark purple or brown: leaves undivided, except No. 3.*

3. **R. trìloba,** L. Hairy, much branched (2°–5° high), the branches slender and spreading; *upper leaves ovate-lanceolate,* sparingly toothed, *the lower 3-lobed,* tapering at the base, *coarsely serrate* (those from the root pinnately parted or undivided); *rays* 8, *oval or oblong; chaff* of the black-purple disk smooth, *awned.* ② — Dry soil, Penn. to Illinois, and southward. Aug. — Heads small, but numerous and showy.

4. **R. speciòsa,** Wender. Roughish-hairy (1°–2° high), branched; the branches upright, elongated and naked above, terminated by single large heads; *leaves lanceolate or ovate-lanceolate, pointed at both ends, petioled,* 3–5-*nerved, coarsely and unequally toothed or incised;* involucre much shorter than the numerous elongated (1′–1½′) rays; chaff of the dark purple disk acutish, smooth. — Dry soil, W. Penn. to Ohio and Virginia. July.

5. **R. fúlgida,** Ait. Hairy, the branches naked at the summit and bearing single heads; *leaves spatulate-oblong* or lanceolate, *partly clasping, triple-nerved, the upper entire, mostly obtuse;* rays about 12, equalling or exceeding the involucre; chaff of the dark purple disk nearly smooth and blunt. — Dry soil, Penn. to Kentucky and southward. — Variable, 1°–3° high: the rays orange-yellow.

6. **R. hírta,** L. Very rough and bristly-hairy throughout; stems simple or branched near the base, stout (1°–2° high), naked above, bearing single large heads; *leaves nearly entire; the upper oblong or lanceolate, sessile;* the lower spatulate, triple-nerved, petioled; rays (about 14) more or less exceeding the involucre; *chaff of the dull brown disk hairy at the tip,* acutish. — Dry soil, W. New York to Wisconsin and southward. Also in S. New York (White Plains) and various parts of N. England, but probably of recent introduction. Aug. — Coarser and less showy than the preceding, variable in the size of the rays.

38. LÉPACHYS, Raf. (OBELISCARIA, *DC.*)

Heads many-flowered, radiate; the rays few, neutral. Scales of the involucre few and small, spreading. Receptacle oblong or columnar: the chaff truncate,

thickened, and bearded at the tip, partly embracing the flattened and margined achenia. Pappus none, or 2 teeth.—Perennial herbs, with alternate pinnate leaves; the grooved stems or branches naked above, and terminated by single showy heads. Rays yellow or party-colored, large and drooping; the disk grayish. (Name from λεπὶς, *a scale*, and παχὺς, *thick*, referring to the thickened tips of the chaff.)

1. **L. pinnàta,** Torr. & Gr. Hoary with minute appressed hairs, slender (4° high), branching; leaflets 3–7, lanceolate, acute; disk oblong, much shorter than the large and drooping light-yellow rays (which are 2′ long).—Dry soil, from Chatauque County, New York (*Sartwell*), to Wisconsin and southward. July.—The receptacle exhales an anisate odor when bruised. Achenia slightly margined on the inner edge, obscurely 2-toothed at the top.

39. HELIÁNTHUS, L. Sunflower.

Heads many-flowered, radiate; the rays several or many, neutral. Involucre imbricated. Receptacle flattish or convex; the persistent chaff embracing the 4-sided and laterally compressed achenia, which are neither winged nor margined. Pappus very deciduous, of 2 thin chaffy-awned scales on the principal angles of the achenium, and often 2 or more little intermediate scales.—Coarse and stout herbs (often exuding a resin), with solitary or corymbed heads, and yellow rays: flowering towards autumn. (Name from ἥλιος, *the sun*, and ἄνθος, *a flower*.)—All our wild species are perennial.

* *Disk convex, dark purple: leaves opposite, or the upper alternate.*

+ *Scales of the involucre tapering into narrow and spreading herbaceous tips.*

1. **H. angustifòlius,** L. Stem slender (2°–6° high); *leaves long and linear*, sessile, entire, with revolute margins, 1-nerved, pale beneath; heads (small) loosely corymbed, long-peduncled.—Low pine barrens, New Jersey to Kentucky and southward.

+ + *Scales of the involucre regularly imbricated and appressed, ovate or broadly lanceolate, obtuse, ciliate, destitute of herbaceous tips.* (*Leaves nearly all opposite.*)

2. **H. atròrubens,** L. *Rough-hairy; stem slender* (2°–5° high), smooth, and naked and forking above; *leaves thin, ovate or oval*, or the lowest heart-shaped (3′–6′ long), serrate, abruptly contracted into a margined petiole; heads small, corymbed; rays 10–16; pappus of 2 fringed scales.—Dry soil, Virginia, Kentucky, and southward.

3. **H. rigidus,** Desf. *Stem stout* (1°–3° high), simple or sparingly branched, rough; *leaves very thick and rigid, rough both sides, oblong-lanceolate*, usually pointed at both ends, nearly sessile, slightly serrate, the lowest oval; heads nearly solitary, pretty large; rays 20–25; pappus of 2 large and often several small scales.—Dry prairies, Michigan to Illinois, and westward.

* * *Disk convex, yellow: scales of the involucre regularly imbricated and appressed, with somewhat spreading and acute (but not foliaceous) tips: leaves chiefly opposite.*

4. **H. lætiflòrus,** Pers. *Stout and rough* (3°–4° high), branching above; *leaves oval-lanceolate, very rough both sides, narrowed into short petioles, serrate*, taper-pointed, the uppermost alternate and nearly entire; heads single or corymbed,

on naked peduncles; scales of the involucre ovate-lanceolate, pointed, ciliate.—Dry open places, Ohio to Illinois, and southward.—Leaves almost as thick as in No. 3. Rays showy, 1′-2′ long.

5. **H. occidentàlis,** Riddell. Somewhat hairy; stem *slender, simple, naked above* (1°-3° high, and sending out runners from the base), bearing 1-5 small heads on long peduncles; *lowest leaves oval or lanceolate-ovate,* 3-nerved, obscurely serrate, *roughish-pubescent beneath, abruptly contracted into long hairy petioles; the upper small and remote* (all opposite), entire; scales of the involucre oval-lanceolate, pointed, ciliate.—Dry barrens, Ohio to Wisconsin, Kentucky, and southward.

6. **H. cinèreus,** var. **Sullivántii,** Torr. & Gr. *Gray with a close roughish pubescence;* stem branching above, hairy; *leaves ovate-oblong, sessile by a narrowed base,* acute, obscurely serrate; the upper small and remote; peduncles slender; scales of the involucre lanceolate, hoary.—Darby Plains, Ohio, *Sullivant.* Stem 2°-3° high, bearing few heads as large as those of the next.

7. **H. móllis,** Lam. Stem clothed with soft white hairs, *simple, leafy* to the top (2°-4° high); *leaves ovate, with a broad heart-shaped and clasping base,* pointed, nearly entire, *hoary above, very soft white-woolly* and reticulated underneath; scales of the involucre lanceolate, downy.—Barrens and prairies, Ohio to Illinois, and westward.

* * * *Heads small: scales of the involucre few, shorter than the yellow disk, irregularly imbricated, appressed, the outer with spreading foliaceous pointed tips: rays 5-8: leaves all but the uppermost opposite.*

8. **H. microcéphalus,** Torr. & Gr. Stem smooth (3°-8° high), with numerous slender branches above; *leaves thin, ovate-lanceolate, taper-pointed,* somewhat serrate, veiny, petioled, *rough above, downy or hairy underneath;* peduncles slender, rough; scales of the involucre ovate and ovate-lanceolate, ciliate.—Thickets, W. Penn. to Illinois, and southward.—Heads ½′ broad, the rays nearly 1′ long.

9. **H. lævigàtus,** Torr. & Gr. Stem slender (1°-4° high), simple or sparingly branched, *very smooth and glabrous throughout,* as well as the slightly serrate *lanceolate leaves.*—Dry soil, Alleghany Mountains, west of the Warm Springs of Virginia, and southward.

* * * * *Heads middle-sized or large: scales of the involucre irregularly imbricated, loose, with spreading foliaceous tips, as long as the yellow disk or longer.*

+ *Leaves chiefly alternate or scattered, feather-veined, sometimes obscurely triple-ribbed.*

10. **H. gigánteus,** L. *Stem hairy or rough* (3°-10° high), branched above; *leaves lanceolate,* pointed, serrate, very rough above, *rough-hairy beneath,* narrowed and ciliate at the base, but *nearly sessile;* scales of the involucre long, linear-lanceolate, pointed, hairy, or strongly ciliate.—Var. AMBÍGUUS has most of the leaves opposite and closely sessile by an obtuse base, and approaches No. 13.—Low thickets and swamps; common. Heads somewhat corymbed: the pale yellow rays 15-20.

11. **H. grosse-serràtus,** Martens. *Stem smooth and glaucous,* at least below (5°-10° high); *leaves elongated-lanceolate* or ovate-lanceolate, taper-

pointed, serrate, rough above, rounded or acute at the base, *petioled*, rough above, *hoary and downy beneath*; scales of the involucre lance-awl-shaped, slightly ciliate.—Dry plains, Ohio to Illinois, and southwestward.—Probably runs into the last.

12. **H. tomentòsus**, Michx. *Stem hairy*, stout (4°–8° high); *leaves oblong-lanceolate, or the lowest ovate*, taper-pointed, obscurely serrate, large (5′–12 long), somewhat petioled, *very rough above, soft-downy beneath*; scales of the involucre with very long and spreading tips, hairy, the chaff and tips of the disk-flowers pubescent. (Disk 1′ broad; rays 12–16, 1′ long.)—Rich woods, Illinois? Virginia and southward along the mountains.

+ + *Leaves opposite, or the uppermost alternate, 3-nerved or triple-ribbed.*

13. **H. strumòsus**, L. Stem rather simple (3°–4° high), smooth below; *leaves ovate-lanceolate, tapering gradually to a point, serrate with small appressed teeth*, abruptly contracted into short margined petioles, rough above, *whitish* and naked *or minutely downy underneath*; scales of the involucre broadly lanceolate with spreading tips, equalling the disk; rays mostly 10.—Var. MÓLLIS has the leaves softly downy underneath.—River-banks and low copses; common, especially westward.

14. **H. divaricàtus**, L. Stem simple or forked and corymbed at the top (1°–4° high) *smooth; leaves all opposite and divaricate, ovate-lanceolate, 3-nerved from the rounded or truncate sessile base*, tapering gradually to a sharp point (3′–6′ long), serrate, *thickish, rough both sides*; scales of the involucre lanceolate from a broad base, pointed, equalling the disk; rays 8–12.—Thickets and barrens; common.—Disk ½′ wide; rays 1′ long.

15. **H. hirsùtus**, Raf. *Stem* simple or forked above, stout (1°–2° high), *bristly-hairy; leaves more or less petioled, ovate-lanceolate*, gradually pointed, *slightly serrate*, rounded or obtuse at the base, *very rough* above, rough-hairy underneath; scales of the involucre ovate-lanceolate, pointed, equalling the disk; rays about 12.—Dry plains, &c., Ohio to Illinois, and southward.—Too near the last.

16. **H. tracheliifòlius**, Willd. Stem loosely branched, tall, hairy; *leaves thin, ovate-lanceolate*, or oblong-lanceolate, *taper-pointed, sharply serrate, smoothish or roughish-pubescent both sides*, contracted into *short petioles*; scales of the involucre lanceolate-linear, elongated and very taper-pointed, loose, exceeding the disk; rays 12–15.—Copses, Penn.? Ohio to Illinois, and southward.—Probably runs into the next.

17. **H. decapétalus**, L. Stem branching (3°–6° high), smooth below; *leaves thin and green both sides, smooth or roughish, ovate, coarsely serrate*, pointed, abruptly contracted into margined petioles; scales of the involucre lanceolate-linear, elongated, loosely spreading, the outer longer than the disk; rays about 10.—Var. FRONDÓSUS has the outer involucral scales foliaceous or changing to leaves.—Copses and low banks of streams; common, especially northward. (H. multiflorus, *L.*, is probably a cultivated state of this.)

18. **H. doronicoìdes**, Lam. Stem stout (5°–8° high), branching, *rough-hairy above; leaves ovate or oblong-lanceolate, pointed, serrate, strongly triple-veined*, rough above, *smoothish or downy underneath*, the lower often heart-shaped

and on margined petioles; scales of the involucre linear-lanceolate, pointed, scarcely exceeding the disk; rays 12-15. — River-bottoms, Ohio to Illinois and southward. — A coarse species, with showy heads, and ample thickish leaves (the lower often 1° long); the upper ones frequently alternate. This is most probably the original of

H. TUBERÒSUS, L., the JERÙSALEM ARTICHOKE, (i. e. *Girasole* of the Italians, meaning the same as sunflower, and corrupted in England into *Jerusalem*), which has all the upper leaves alternate. It has escaped from old gardens into fence-rows in some places.

H. ÁNNUUS, L., the COMMON SUNFLOWER, which sometimes sows itself around dwellings, belongs to the annual section of the genus, with large flat heads and a brownish disk. It probably belongs to the warmer parts of North America.

40. ACTINÓMERIS, Nutt. ACTINOMERIS.

Heads many-flowered; the rays few or several, neutral, or rarely none. Involucre foliaceous, nearly equal, in 1 to 3 rows. Receptacle convex or conical, chaffy; the chaff embracing the outer margin of the flat (laterally compressed) and winged achenia. Pappus of 2 smooth persistent awns. — Tall and branching perennial herbs, with serrate feather-veined leaves, tapering to the base and mostly decurrent on the stem. Heads corymbed: flowers chiefly yellow. (Name from ἀκτίν, *a ray*, and μερίς, *a part;* alluding to the fewness or irregularity of the rays.)

1. **A. squarròsa,** Nutt. *Stem somewhat* hairy and *winged above* (4°-8° high); leaves alternate or the lower opposite, oblong or ovate-lanceolate, pointed at both ends; heads in an open corymbed panicle; scales of the *involucre* in 2 rows, the outer linear-spatulate, *reflexed; rays* 4-10, *irregular;* achenia broadly winged; receptacle globular. — Rich soil, W. New York (*Sartwell*) to Michigan, Illinois, and southward. Sept.

2. **A. helianthoìdes,** Nutt. *Stem* hairy (1°-3° high), *widely winged* by the ovate-lanceolate sessile alternate leaves, which are rough above and soft-hairy beneath; heads few; scales of the *involucre not spreading; rays* 8-15, *regular,* narrow; achenia oval, slightly winged, tipped with 2 fragile bristly awns; receptacle conical. — Prairies and copses, Ohio to Illinois, and southward. July.

41. COREÓPSIS, L. TICKSEED.

Heads many-flowered, radiate; the rays mostly 8, neutral, rarely wanting. Involucre double; each of about 8 scales, the outer rather foliaceous and somewhat spreading; the inner broader and appressed, nearly membranaceous. Receptacle flat, with membranaceous chaff deciduous with the fruit. Achenia flat (compressed parallel with the scales of the involucre), often winged, not beaked or narrowed at the top, 2-toothed, 2-awned, or sometimes naked at the summit, the awns never barbed downwardly. — Herbs, generally with opposite leaves, and yellow or party-colored, rarely purple, rays. (Name from κόρις, *a bug,* and ὄψις, *resemblance;* from the form of the fruit.)

§ 1. *Corolla of the ray and disk yellow: branches of the style tipped with a pointed or acute appendage.*

* *Achenia wingless, wedge-oblong, flat, 2-awned or 2-toothed: scales of the outer involucre leafy, reflexed: leaves opposite, petioled, generally pinnately or ternately compound, the leaflets serrate: biennials?* (Plants with the aspect of Bidens, but the awns barbed upwardly.)

+ *Rays wanting.*

1. **C. discoìdea,** Torr. & Gr. Smooth, diffusely branched; *leaves ternately divided;* leaflets ovate-lanceolate, pointed, coarsely serrate; heads paniculate-corymbed; outer involucre of 3 – 5 foliaceous bracts usually much longer than the heads; achenia hairy; the *awns or teeth as long as the corolla,* barbed upward. — Wet places, Ohio and southward. July – Sept. — Plant 1° – 2° high.

2. **C. bidentoìdes,** Nutt. *Dwarf,* diffusely branched, smoothish; *leaves lanceolate-linear, cut-toothed,* tapering into a petiole; *awns* slender, upwardly barbed, *much longer than the corolla* or the bristly young achenium. — Near Philadelphia, *Nuttall.* — A very obscure species.

+ + *Rays conspicuous (golden-yellow and showy).*

3. **C. trichospérma,** Michx. (TICKSEED SUNFLOWER.) Smooth, branched; leaves short-petioled, 5 – 7-divided; leaflets lanceolate or linear, cut-toothed, or the upper leaves only 3 – 5-cleft and almost sessile; heads panicled-corymbose; *achenia narrowly wedge-oblong,* bristly-ciliate above, *crowned with 2 triangular or awl-shaped stout teeth.* — Swamps, Massachusetts to Virginia near the coast. Sept.

4. **C. aristòsa,** Michx. Somewhat pubescent; leaves 1 – 2-pinnately 5 – 7-divided, petioled; leaflets lanceolate, cut-toothed or pinnatifid; heads panicled-corymbose; outer involucre of 10 – 12 leafy bracts; *achenia oblong-obovate,* obscurely margined, bristly-ciliate, *with 2 – 4 long and slender diverging awns* (in one variety awnless). — Swamps, Michigan to Wisconsin, and southward. Aug.

* * *Achenia elliptical, narrowly winged, the narrowly notched summit of the wing minutely lacerate-toothed: scales of the outer involucre foliaceous, much smaller than the inner, all united at the base: rays obtuse, entire: leaves opposite, petioled, 3 – 5-divided: perennial.*

5. **C. trípteris,** L. (TALL COREOPSIS.) Smooth; stem simple (4° – 9° high), corymbed at the top; leaflets lanceolate, acute, entire. (Chrysostémma, *Less.*) — Rich soil, Michigan to Illinois and southward. Aug. — Heads exhaling the odor of anise when bruised: disk turning brownish.

* * * *Achenia oblong, narrowly winged, minutely or obscurely 2-toothed at the summit: scales of the outer involucre narrow, about the length of the inner, all united at the base: rays mostly entire and acute: leaves opposite, sessile, mostly 3-divided, therefore appearing as if whorled: perennial* (1° – 3° *high*).

6. **C. senifòlia,** Michx. Leaves each divided into 3 sessile *ovate-lanceolate entire leaflets,* therefore appearing like 6 in a whorl: plant minutely soft-pubescent. — Sandy woods, Virginia and southward. July.

Var. **stellàta,** Torr. & Gr. Glabrous; the leaves narrower. (C. stellata, *Nutt.*) Virginia, Kentucky, and southward.

7. **C. delphinifòlia,** Lam. Glabrous or nearly so; leaves divided into 3 sessile *leaflets* which are 2 - 5-*parted, their divisions lance-linear* (1'' - 3'' broad), rather rigid; disk brownish. — Pine woods, Virginia and southward. July.

8. **C. verticillàta,** L. Glabrous; leaves divided into 3 sessile *leaflets* which are 1 - 2-*pinnately parted into narrowly linear or filiform divisions.* — Damp soil, from Maryland and Michigan southward. Also in gardens. July - Sept.

9. **C. palmàta,** Nutt. Nearly smooth, simple; *leaves* broadly *wedge-shaped, deeply* 3-*cleft*, rigid; the *lobes broadly linear, entire,* or the middle one 3-lobed. — Prairies, Michigan to Wisconsin, and southwestward. July.

* * * * *Achenia nearly orbicular, broadly winged, incurved, furnished with a callous tubercle on the inside at the top and bottom, crowned with 2 small chaff-like denticulate teeth: outer involucre about the length of the inner: rays large, coarsely 3 - 5-toothed: leaves opposite or the uppermost alternate: heads on long naked peduncles.*

10. **C. auriculàta,** Linn. Pubescent or glabrous; stems 1° - 4° high, branching, sometimes with runners; *leaves mostly petioled, the upper oblong or oval-lanceolate,* entire; *the lower oval or roundish, some of them variously* 3 - 5-*lobed or divided;* scales of the outer involucre oblong-linear or lanceolate. ♃ — Rich woods and banks, Virginia, Kentucky, and southward. June - Sept.

11. **C. lanceolàta,** L. Smooth or hairy (1° - 2° high); stems short, tufted, branched only at the base; *leaves all entire, lanceolate, sessile, the lowest oblanceolate or spatulate,* tapering into petioles; scales of the outer involucre ovate-lanceolate. ♃ — Rich or damp soil, Michigan to Virginia, Kentucky, and southward. July. Also cultivated. — Heads showy: rays 1' long.

§ 2. *Branches of the style truncate: rays rose-color: disk yellow.*

12. **C. ròsea,** Nutt. (ROSE-FLOWERED COREOPSIS.) Stem branching, leafy, smooth (6' - 20' high); leaves opposite, linear, entire; heads small, somewhat corymbed, on short peduncles; outer involucre very short; rays 3-toothed; achenia oblong, wingless; pappus an obscure crown-like border. ♃ — Sandy and grassy swamps, Plymouth, Massachusetts, to New Jersey, and southward: rare. Aug.

C. TINCTÒRIA, Nutt., a native of the plains beyond the Mississippi, with the rays yellow above, and brown-purple towards the base, is now everywhere common in gardens.

42. BÌDENS, L. BUR-MARIGOLD.

Heads many-flowered; the rays when present 3 - 8, neutral. Involucre double, the outer commonly large and foliaceous. Receptacle flattish, the chaff deciduous with the fruit. Achenia flattened parallel with the scales of the involucre, or slender and 4-sided, crowned with 2 or more rigid and persistent awns which are downwardly barbed. — Annual or perennial herbs, with opposite various leaves, and mostly yellow flowers. (Latin *bidens*, two-toothed.)

* *Achenia flat, not tapering at the summit.* (*All annuals?*)

1. **B. frondòsa,** L. (COMMON BEGGAR-TICKS.) Smooth or rather hairy, tall (2° - 6° high) and branching; *leaves* 3 - 5-*divided; the leaflets lanceo-*

late, pointed, coarsely toothed, *mostly stalked;* outer leafy involucre much longer than the head, ciliate below; *rays none; achenia wedge-obovate,* 2-*awned, the margins ciliate with upward bristles,* except near the summit. — Moist waste places, a common coarse weed, very troublesome; the achenia, as in the other species, adhering by their retrorsely barbed awns to the dress, and to the fleece of animals. July-Sept. — In Western New York, Dr. Sartwell has found it with one or two small rays!

2. **B. connàta,** Muhl. (Swamp Beggar-ticks.) Smooth (1°-2° high); *leaves lanceolate* or oblong-lanceolate, pointed, sharply serrate, tapering into margined petioles which are slightly united at the base; *the lower often* 3-*divided; the lateral divisions united at the base and decurrent on the petiole;* scales of the outer involucre longer than the head, mostly obtuse, scarcely ciliate; *rays none; achenia narrowly wedge-form,* 3- (2-4-) *awned,* and with downwardly barbed margins. (B. tripartita, *Bigel.*) — A thin-leaved more petioled form is B. petiolata, *Nutt.* — Wet grounds, New York to Illinois, and southward.

3. **B. cérnua,** L. (Bur-Marigold.) Nearly smooth (5′-10′ high); *leaves all undivided, lanceolate, unequally serrate, scarcely connate; heads* nodding, *with or without* (light yellow) *rays;* outer involucre longer than the head; achenia wedge-obovate, 4-awned, the margins downwardly barbed. — Wet places, New England to Wisconsin, and northward. — Rays, when present, smaller than in the next, the leaves irregularly toothed, and the outer involucre more leaf-like. (Eu.)

4. **B. chrysanthemoìdes,** Michx. (Bur-Marigold.) Smooth, erect or reclining at the base (6′-30′ high); *leaves lanceolate,* tapering at both ends, more or less connate, *regularly serrate; heads* erect or nodding, *conspicuously radiate;* outer involucre mostly shorter than the golden-yellow (1′ long) rays; achenia wedge-shaped, with almost prickly downwardly barbed margins; awns 2, 3, or 4. — Swamps; common. Aug.-Oct. — Probably runs into No. 3.

* * *Achenia linear-4-sided, slender, tapering at the summit.*

5. **B. Béckii,** Torr. (Water Marigold.) *Aquatic,* smooth; stems long and slender, bearing crowded *immersed leaves many times dissected into fine capillary divisions;* the few emerging leaves lanceolate, slightly connate, toothed; heads single, short-peduncled; *involucre* much *shorter than the showy (golden-yellow) rays;* achenia linear, thickish, smooth (½′ long), bearing 4-6 stout divergent awns which are 1′ long, barbed only towards the apex. ♃ — Ponds and slow deep streams, Massachusetts (rare) to Illinois and Wisconsin.

6. **B. bipinnàta,** L. (Spanish Needles.) Smooth, branched (1°-4° high); *leaves* 1-3-*pinnately parted,* petioled; *leaflets ovate-lanceolate,* mostly wedge-shaped at the base; heads small, on slender peduncles; *outer involucre* of linear scales, *nearly as long as the short pale yellow rays;* achenia long and slender, 4-grooved and angled, nearly smooth, 3-4-awned. ① — Dry soil, Connecticut to Illinois, and southward.

43. VERBESÌNA, L. Crownbeard.

Heads several-many-flowered; the rays pistillate, few, or sometimes none. Scales of the erect involucre few, imbricated in 2 or more rows. Receptacle rather convex, the chaff concave. Achenia flat (compressed laterally), winged or wingless, 2-awned. — Perennial herbs; the toothed or lobed leaves decurrent on the stem. ("Name altered from Verbena.")

1. **V. Siegesbéckia,** Michx. Stem tall, 4-winged; *leaves opposite*, ovate, triple-nerved, serrate, pointed at both ends, often pubescent beneath (large and thin); heads in compound corymbs; *flowers yellow;* rays 1 - 5, lanceolate; achenia wingless. — Rich soil, W. Penn. to Illinois, and southward. July.

2. **V. Virgínica,** L. Stem narrowly or interruptedly winged, *downy-pubescent, like the lower surface of the* ovate-lanceolate feather-veined *alternate leaves;* heads in compound corymbs; *flowers white;* rays 3 - 4, oval; achenia narrowly winged. — Dry soil, Pennsylvania? Illinois, and southward. Aug.

44. DYSÒDIA, Cav. FETID MARIGOLD.

Heads many-flowered, usually radiate; the rays pistillate. Involucre of one row of scales united into a firm cup, at the base some loose bractlets. Receptacle flat, not chaffy, but beset with short chaffy bristles. Achenia slender, 4-angled. Pappus a row of chaffy scales dissected into numerous rough bristles. — Herbs, dotted with large pellucid glands, which give a strong odor; the heads terminating the branches: flowers yellow. (Name δυσωδία, *an ill smell*, which the plants possess.)

1. **D. chrysanthemoìdes,** Lag. Nearly smooth, diffusely branched (6′ - 18′ high); leaves opposite, pinnately parted, the narrow lobes bristly-toothed or cut; rays few, scarcely exceeding the involucre. ① — Alluvial banks of rivers, from Illinois southward. Aug. - Oct.

TAGÈTES PÁTULA, L., the FRENCH MARIGOLD of the gardens, belongs to the same group as the foregoing.

45. HYMENOPÁPPUS, L'Her. HYMENOPAPPUS.

Heads many-flowered; the flowers all tubular and perfect. Scales of the involucre 6 - 12, loose and broad, thin, the upper part petal-like (usually white). Receptacle small, naked. Corolla with large revolute lobes. Achenia top-shaped, with a slender base, striate. Pappus of 15 - 20 small and blunt scales in a single row, very thin (whence the name of the genus, from ὑμήν, *membrane*, and πάππυς, *pappus*). — Biennial or perennial herbs, with alternate mostly dissected leaves, and corymbed small heads of usually whitish flowers.

1. **H. scabiosæ̀us,** L'Her. Somewhat flocculent-woolly when young (1° - 3° high); leaves 1 - 2-pinnately parted into linear or oblong lobes; scales of the involucre roundish, nearly all whitish. — Sandy barrens, Illinois and southward. May, June.

46. HELÈNIUM, L. FALSE SUNFLOWER.

Heads many-flowered, radiate; the spreading wedge-shaped rays several, 3 - 5-cleft at the summit, fertile. Involucre small, reflexed, the scales linear or awl-shaped. Receptacle globose or oblong, naked. Achenia top-shaped, ribbed. Pappus of 5 - 8 thin and 1-nerved chaffy scales, the nerve extended into a bristle or point. — Erect, branching herbs, with alternate leaves decurrent on the angled stem and branches, which are terminated by single or corymbed (yellow, rarely purple) heads; often sprinkled with bitter and aromatic resinous globules. (Named after *Helen*, the wife of Menelaus.)

1. **H. autumnàle,** L. (SNEEZE-WEED.) Nearly smooth; leaves lanceolate, toothed; rays longer than the globular disk. ♃ — Alluvial river-banks; common (except in New England). Sept. — Plant 1° - 3° high, bitter: the corymbed heads showy.

47. LEPTÓPODA, Nutt. LEPTOPODA.

Rays neutral. Otherwise nearly as in Helenium. — In the true species (of which *L. puberula* and *L. brevifolia* may be found in S. Virginia) the stems are simple, naked above, like a long peduncle, and bearing a single head (whence the name, from λεπτός, *slender*, and πούς, *foot*); but the following is leafy to the top, and branched.

1. **L. brachýpoda,** Torr. & Gray. Stem corymbed at the summit (1° - 4° high); leaves oblong-lanceolate, decurrent on the stem; disk globular, brownish; rays pretty large (½′ - ¾′ long), yellow, or in one variety brownish-purple, sometimes with an imperfect style. ♃ — Damp soil, from Illinois southward. June - Aug.

48. BALDWÍNIA, Nutt. BALDWINIA.

Heads globular, many-flowered, radiate; the long and narrowly wedge-shaped rays neutral. Involucre short, of many thickish small scales imbricated in 3 or 4 rows, the outer obovate and obtuse. Receptacle strongly convex, with deep honeycomb-like cells containing the obconical or oblong silky-villous achenia. Pappus of 7 - 9 lance-oblong erect chaffy scales. — A perennial herb, smoothish, with slender simple stems (2° - 3° high), bearing alternate oblanceolate leaves, and the long naked summit terminated by a showy large head. Rays yellow (1′ long); the disk-flowers often turning dark purple. (Named for the late *Dr. William Baldwin.*)

1. **B. uniflòra,** Nutt. — Borders of swamps, Virginia and southward. Aug.

49. MARSHÁLLIA, Schreb. MARSHALLIA.

Heads many-flowered; the flowers all tubular and perfect. Scales of the involucre linear-lanceolate, foliaceous, erect, in one or two rows, nearly equal. Receptacle convex or conical, with narrowly linear rigid chaff among the flowers. Lobes of the corolla slender, spreading. Achenia top-shaped, 5-angled. Pappus of 5 or 6 membranaceous and pointed chaffy scales. — Smooth and low perennials, with alternate and entire 3-nerved leaves, and solitary heads (resembling those of a Scabious) terminating the naked summit of the simple stem or branches. Flowers purplish; the anthers blue. (Named for *Humphry Marshall*, of Pennsylvania, author of one of the earliest works on the trees and shrubs of this country.)

1. **M. latifòlia,** Pursh. Stems leafy; leaves ovate-lanceolate, pointed, sessile. — Dry soil, Virginia and southward. (M. LANCEOLATA and M. ANGUSTIFOLIA may occur in S. Virginia.)

50. GALINSÒGA, Ruiz & Pav. GALINSOGA.

Heads several-flowered, radiate; the rays 4 – 5, small, roundish, pistillate. Involucre of 4 or 5 ovate thin scales. Receptacle conical, with narrow chaff among the flowers. Achenia angled. Pappus of small oblong cut-fringed chaffy scales (sometimes wanting). — Annual herbs, with opposite triple-nerved thin leaves, and small heads: disk-flowers yellow: rays whitish. (Named for *Galinsoga*, a Spanish botanist.)

1. G. PARVIFLÒRA, Cav. Smoothish (1° high); leaves ovate, acute, somewhat toothed; scales of the pappus 8 – 16. — Waste places; Cambridge, Mass., New York, and Philadelphia. (Adv. from S. Amer.)

51. MARÙTA, Cass. MAY-WEED.

Heads many-flowered, radiate; the rays neutral. Involucre of many small somewhat imbricated scales, shorter than the disk. Receptacle conical, bearing slender chaff, at least near the summit. Achenia obovoid, ribbed, smooth. Pappus none. — Annual acrid herbs, with a strong odor, finely thrice-pinnately divided leaves, and single heads terminating the branches. Rays white, soon reflexed; the disk yellow. (Derivation unknown.)

1. **M.** CÓTULA, DC. (COMMON MAY-WEED.) Scales of the involucre with whitish margins. — Road-sides; very common. (Nat. from Eu.)

52. ÁNTHEMIS, L. CHAMOMILE.

Heads and flowers as in Maruta, but the rays pistillate. Achenia terete, striate or smooth. Pappus none, or a minute crown. — Herbs with aromatic or strong odor, 1 – 2-pinnately divided leaves, the branches terminated by single heads. Rays white, the disk yellow. (*'Ανθεμίς*, the ancient name, given in allusion to the profusion of the flowers.)

1. **A.** ARVÉNSIS, L. (CORN CHAMOMILE.) Pubescent; leaflets or divisions linear-lanceolate, toothed, very acute; branchlets leafless at the summit; chaff lanceolate, pointed, membranaceous; achenia crowned with a very short somewhat toothed margin; those of the ray sometimes sterile. ② — Fields, N. England and New York, sparingly introduced. — Much resembles the May-weed. (Adv. from Eu.)

A. NÓBILIS, L., the officinal CHAMOMILE, is said to be somewhat naturalized in Delaware.

53. ACHILLÈA, L. YARROW.

Heads many-flowered, radiate; the rays few, fertile. Involucre imbricated. Receptacle chaffy, flattish. Achenia oblong, flattened, margined. Pappus none. — Perennial herbs, with small corymbose heads. (So named because its virtues are said to have been discovered by *Achilles*.)

1. **A. Millefòlium**, L. (COMMON YARROW or MILFOIL.) Stems simple; *leaves twice-pinnately parted;* the divisions linear, 3-5-cleft, crowded; corymb compound, flat-topped; *involucre oblong; rays* 4-5, *short*, white (sometimes rose-color). — Fields and hills; common northward. Aug. (Eu.)

2. **A.** PTÁRMICA, L. (SNEEZEWORT.) *Leaves simple, lance-linear*, sharply serrate with appressed teeth; corymb loose; *rays* 8-12, *much longer than the involucre;* flowers white. — Danvers, Massachusetts, &c. (Adv. from Eu.)

54. LEUCÁNTHEMUM, Tourn. OX-EYE DAISY.

Heads many-flowered, radiate; the rays numerous, fertile. Scales of the broad and flat involúcre imbricated, with scarious margins. Receptacle flattish, naked. Disk-corollas with a flattened tube. Achenia of the disk and ray similar, striate, destitute of pappus. — Perennial herbs, with toothed or pinnatifid leaves, and large single heads terminating the stem or branches. Rays white; disk yellow. (Name composed of λευκός, *white*, and ἄνθεμον, *a flower*, from the white rays.)

1. **L.** VULGÀRE, Lam. (OX-EYE or WHITE DAISY. WHITE-WEED.) Stem erect, nearly simple, naked above; root-leaves spatulate, petioled, the others partly clasping, all cut or pinnatifid-toothed; scales of the involucre with rusty brown margins. (Chrysánthemum Leucanthemum, *L.*) — Fields and meadows; too abundant. June, July. A pernicious weed, with large and showy heads: in Connecticut is a variety with short rays. (Nat. from Eu.)

55. MATRICÀRIA, Tourn. WILD CHAMOMILE. FEVERFEW.

Heads many-flowered; the rays pistillate, or wanting. Scales of the involucre imbricated, with scarious margins. Receptacle conical or hemispherical, naked. Disk-flowers flattened or terete. Achenia angular, wingless. Pappus a membranaceous crown or border, or none. — Smooth and branching herbs, with divided leaves and single or corymbed heads. Rays white: disk yellow. (Named for reputed medicinal virtues.)

1. **M.** PARTHÈNIUM, L. (FEVERFEW.) Leaves twice-pinnately divided; the *divisions ovate, cut; heads corymbed, with rays.* ♃ (Pyrethrum Parthenium, *Smith.*) — Escaped from gardens in some places. (Adv. from Eu.)

2. **M. discoìdea**, DC. Low (6′-9′ high); leaves 2-3-pinnately parted into short linear lobes; *heads rayless;* scales of the involucre oval, with broad margins, much shorter than the conical disk; pappus obsolete. ① ②. — Illinois, opposite St. Louis. An immigrant from Oregon? (Eu.?)

56. TANACÈTUM, L. TANSY.

Heads many-flowered, nearly discoid, all fertile; the marginal flowers chiefly pistillate and 3-5-toothed. Scales of the involucre imbricated, dry. Receptacle convex, naked. Achenia angled or ribbed, with a large flat top. Pappus a short crown. — Bitter and acrid strong-scented herbs, with 1-2-pinnately dissected leaves and rather large corymbed heads. Flowers yellow. (Name said to be a corruption of ἀθανασία, *undying*, from its durable flowers.)

1. **T.** VULGÀRE, L. (Common Tansy.) Stem erect, smooth; leaves twice-pinnately parted, the leaflets and the margined petiole cut-toothed; corymb dense; pistillate flowers terete; pappus 5-lobed. — Var. CRÍSPUM has the leaves more cut and crisped. ♃ — Escaped from gardens. (Adv. from Eu.)

2. **T. Huronénse,** Nutt. Hairy or woolly when young, stout (1° – 3° high); leaves 2 – 3-pinnately dissected, the lobes oblong; heads large (½′ – ¾ wide) and usually few; pistillate flowers flattened, 3 – 5-cleft; pappus toothed. ♃ — Shores of L. Huron, Superior, and northwestward.

57. ARTEMÍSIA, L. Wormwood.

Heads discoid, few – many-flowered; the flowers all tubular, the marginal ones pistillate, or sometimes all similar and perfect. Scales of the involucre imbricated, with dry and scarious margins. Receptacle small and flattish, naked. Achenia obovoid, with a small summit and no pappus. — Herbs or shrubby plants, bitter and aromatic, with small heads in panicled spikes or racemes. Corolla yellow or purplish. (Dedicated to *Artemis*, the Greek Diana.)

§ 1. *Receptacle smooth: marginal flowers pistillate and fertile: disk-flowers sterile.*

1. **A. boreàlis,** Pallas. *Low* (3′ – 6′ high), tufted, silky-villous or nearly smooth; *lower leaves* 3 – 5-*cleft at the apex*, or like the others 1 – 2-*pinnately parted, the lobes lanceolate or linear; heads few*, hemispherical, pretty large, *spiked or racemed.* ♃ — Shore of Lake Superior and northward. (Eu.)

2. **A. Canadénsis,** Michx. (Canada Wormwood.) Smooth, or hoary with silky down (1° – 2° high); lower leaves twice-pinnately divided, the upper 3 – 7-divided; the *divisions linear, rather rigid; heads rather large in panicled racemes.* ♃ — Shore of all the Great Lakes, and northward. (Eu.)

3. **A. caudàta,** Michx. (Slender Wormwood.) Smooth (2° – 5° high); upper leaves pinnately, the lower 2 – 3-pinnately divided; the *divisions thread-form*, spreading; *heads small, the racemes in a wand-like elongated panicle.* — Sandy soil, coast of New Hampshire to New Jersey; and in Illinois.

§ 2. *Receptacle smooth: flowers all fertile, a few pistillate, the others perfect.*

4. **A. Ludoviciàna,** Nutt. (Western Mugwort.) *Whitened-woolly* throughout, branched (1° – 5° high); *leaves lanceolate*, the lower mostly cut-toothed or pinnatifid, *the upper mostly entire*, the upper surface often becoming naked and smooth with age; *heads* ovoid, mostly sessile, disposed *in narrow leafy panicles.* ♃ — Dry banks, Lakes Huron and Michigan, and westward; especially the var. GNAPHALÒDES, which has the elongated nearly entire leaves very woolly both sides.

5. **A.** VULGÀRIS, L. (Common Mugwort.) Branches and lower surface of the leaves *whitish-woolly; stem-leaves pinnatifid*, with the *lobes variously cut or entire, linear-lanceolate; heads* ovoid, *in open leafy panicles.* ♃ — Waste places, near dwellings. (Adv. from Eu.)

6. **A. biénnis,** Willd. (Biennial Wormwood.) *Smooth*, simple (1° – 3° high); *lower leaves twice-pinnately parted, the upper pinnatifid;* lobes linear, acute, in the lower leaves cut-toothed; heads in short axillary spikes, which are

crowded in a narrow and clustered leafy panicle. ② — River-banks, Ohio to Illinois, and northward. Aug.

§ 3. *Receptacle hairy : flowers all fertile, the marginal ones pistillate.*

7. **A.** Absínthium, L. (Common Wormwood.) Rather shrubby, silky-hoary; leaves 2- 3-pinnately parted; the lobes lanceolate; heads panicled, nodding. — Road-sides, sparingly escaped from gardens. (Adv. from Eu.)

A. Abrótanum, L. (Southern-wood), is found in some gardens.

58. GNAPHÀLIUM, L. Cudweed.

Heads many-flowered; the flowers all tubular; the outer pistillate and very slender, the central perfect. Scales of the involucre dry and scarious, white or colored, imbricated in several rows. Receptacle flat, naked. Pappus a single row of capillary rough bristles. — Woolly herbs, with sessile or decurrent leaves, and clustered or corymbed heads. Corolla whitish or yellowish. (Name from *γνάφαλον, a lock of wool,* in allusion to the floccose down of the leaves.)

* *Achenia nearly terete: pistillate flowers occupying several rows.*

1. **G. decúrrens,** Ives. (Everlasting.) Stem stout, erect (2° high), branched at the top, clammy-pubescent, white-woolly on the branches, bearing numerous *heads in dense corymbed clusters; leaves* linear-lanceolate, *partly clasping, decurrent;* scales of the (yellowish-white) involucre oval, acutish. ♃ — Hill-sides, New Jersey and Penn.? to Maine and northward. Aug.-Sept.

2. **G. polycéphalum,** Michx. (Common Everlasting.) Stem erect, woolly; *leaves* lanceolate, *tapering at the base,* with undulate margins, *not decurrent,* smoothish above; *heads clustered at the summit of the panicled-corymbose branches,* ovate-conical before expansion, then obovate; scales of the (whitish) involucre ovate and oblong, rather obtuse; perfect flowers few. ① — Old fields and woods; common. — Plant fragrant, 1°-2° high.

3. **G. uliginòsum,** L. (Low Cudweed.) *Diffusely branched,* woolly all over (3′-6′ high); leaves lanceolate or linear, not decurrent; *heads (small) in terminal sessile capitate clusters* subtended by leaves; scales of the involucre oblong. ① — Low grounds, and ditches by the road-side, everywhere. (Eu.)

4. **G. purpùreum,** L. (Purplish Cudweed.) *Stem simple,* or branched from the base, ascending (6′-20′ high), woolly; leaves oblong-spatulate, mostly obtuse, not decurrent, green above, very white with close wool underneath; *heads in sessile clusters in the axils of the upper leaves, and spiked at the wand-like summit of the stem;* scales of the involucre lance-oblong, tawny-white, the inner often marked with purple. — Sandy or gravelly soil, coast of Maine to Virginia, and southward.

* * *Achenia flattish: pistillate flowers in a single marginal row.*

5. **G. supìnum,** Villars. (Mountain Cudweed.) Dwarf and tufted; leaves linear, woolly; heads solitary or few and spiked on the slender simple flowering stems; scales of the involucre brown, lanceolate, acute. ♃ — Alpine summit of Mount Washington, New Hampshire: rare. (Eu.)

59. ANTENNÀRIA, Gærtn. EVERLASTING.

Heads many-flowered, diœcious or nearly so; the flowers all tubular: pistillate corollas very slender. Scales of the involucre dry and scarious, white or colored, imbricated. Receptacle convex or flat, not chaffy. Pappus a single row of bristles, which in the fertile flowers are capillary, and in the sterile thickened and club-shaped or barbellate* at the summit. — Perennial white-woolly herbs, with entire leaves and corymbed (rarely single) heads. Corolla yellowish. (So named from the resemblance of the sterile pappus to the *antennæ* of many insects.)

1. **A. margaritàcea,** R. Brown. (PEARLY EVERLASTING.) *Stem erect* (1° - 2° high), *corymbose* at the summit, with many heads, *leafy;* leaves linear-lanceolate, taper-pointed, sessile; fertile heads often with a few imperfect staminate flowers in the centre; scales of the pearly-white involucre obtuse or rounded. — Dry hills and woods; common northward. Aug.

2. **A. plantaginifòlia,** Hook. (PLANTAIN-LEAVED EVERLASTING.) *Spreading by offsets and runners,* low (4′ - 10′ high); leaves silky-woolly when young, at length green above and hoary beneath; those of the *simple and scape-like flowering stems* small, lanceolate, appressed; the radical obovate or oval-spatulate, petioled, ample, 3-nerved; heads in a small crowded corymb; scales of the (mostly white) involucre obtuse in the sterile, and acutish and narrower in the fertile plant. — Var. MONOCÉPHALA has a single larger head. (Philadelphia, *Mr. Lea.*) — Sterile knolls and banks, common. March - May.

60. FILÀGO, Tourn. COTTON-ROSE.

Heads many-flowered; the flowers all tubular, the central ones perfect, but often infertile; the others pistillate, very slender and thread-form. Scales of the involucre few and woolly. Receptacle elongated or top-shaped, naked at the summit, but chaffy at the margins or toward the base; the chaff resembling the proper involucral scales, each covering a single pistillate flower. — Pappus of the central flowers capillary, of the outer ones chiefly none. — Annual, low, branching woolly herbs, with entire leaves and small heads in capitate clusters. (Name from *filum,* a thread, in allusion to the cottony hairs of these plants.)

1. **F.** GERMÁNICA, L. (HERBA IMPIA.) Stem erect, short, clothed with lanceolate and upright crowded leaves, producing a capitate cluster of woolly heads, from which rise one or more branches, each terminated by a similar head, and so on: — hence the common name applied to it by the old botanists, as if the offspring were undutifully exalting themselves above the parent. — Dry fields, New York to Virginia. July - Oct. (Nat. from Eu.)

61. ERECHTHÌTES, Raf. FIREWEED.

Heads many-flowered; the flowers all tubular and fertile; the marginal pistillate, with a slender corolla. Scales of the cylindrical involucre in a single row, linear, acute, with a few small bractlets at the base. Receptacle naked. Achenia oblong, tapering at the end. Pappus copious, of very fine and white soft hairs.—Erect and coarse annuals, of a rank smell, with alternate simple leaves, and paniculate-corymbed heads of whitish flowers. (The ancient name of some species of Groundsel, probably called after *Erechtheus*.)

1. **E. hieracifòlia,** Raf. (FIREWEED.) Often hairy; stem grooved; leaves lanceolate or oblong, acute, cut-toothed, sessile; the upper often with an auricled clasping base. (Senècio hieracifòlius, L.)—Moist woods; common, especially northward, and in recent clearings, where the ground has been burned over; whence the popular name. July–Sept.—Plant 1°–5° high, with somewhat the aspect of a Sow-thistle.

62. CACÀLIA, L. INDIAN PLANTAIN.

Heads 5–many-flowered; the flowers all tubular and perfect. Scales of the involucre in a single row, with a few bractlets at the base. Receptacle naked. Corolla deeply 5-cleft. Achenia oblong, smooth. Pappus of numerous capillary bristles.—Smooth and tall perennial herbs, with alternate often petioled leaves, and rather large heads in flat corymbs. Flowers white or whitish. (An ancient name, of uncertain meaning.)

* *Involucre 25–30-flowered, with several bracts at its base: receptacle flat.*

1. **C. suavèolens,** L. Stem grooved (3°–5° high); *leaves triangular-lanceolate, halberd-shaped,* pointed, serrate, those of the stem on winged petioles.—Rich woods, Connecticut to Wisconsin and Kentucky. Sept.

* * *Involucre 5-leaved and 5-flowered, its bracts minute or none: receptacle bearing a more or less evident scale-like pointed appendage in the centre.*

2. **C. renifórmis,** Muhl. (GREAT INDIAN PLANTAIN.) Stem (4°–9° high) grooved and angled; *leaves green both sides, dilated fan-shaped, or the lowest kidney-form* (1°–2° broad), *repand-toothed* and angled, palmately veined, petioled; the teeth pointed; corymbs large.—Rich damp woods, Penn. to Illinois, and southward along the mountains. Aug.

3. **C. atriplicifòlia,** L. (PALE INDIAN PLANTAIN.) Stem terete (3°–6° high), and with the *palmately veined and angulate-lobed leaves glaucous;* lower leaves triangular-kidney-form or slightly heart-shaped; the upper rhomboid or wedge-form, *toothed.*—Rich woodlands, W. New York to Wisconsin, and southward. Aug.

4. **C. tuberòsa,** Nutt. (TUBEROUS INDIAN PLANTAIN.) Stem angled and grooved (2°–6° high), from a thick or tuberous root; *leaves green both sides,* thick, strongly 5–7-*nerved;* the lower *lance-ovate or oval,* nearly entire, tapering into long petioles; the upper on short margined petioles, sometimes toothed at the apex.—Wet prairies, &c., Ohio to Wisconsin, and southward. June.

63. SENÈCIO, L. GROUNDSEL.

Heads many-flowered; the flowers all perfect and tubular, or mostly with the marginal ones radiate; the rays pistillate. Scales of the involucre in a single row, or with a few bractlets at the base. Receptacle flat, naked. Pappus of numerous very soft and slender capillary bristles.—Herbs, in the United States, with alternate leaves and solitary or corymbed heads. Flowers chiefly yellow. (Name from *senex*, an old man, alluding to the hoary hairs which cover many species, or to the white hairs of the pappus.)

* *Rays none: root annual.*

1. **S.** VULGÀRIS, L. (COMMON GROUNDSEL.) Nearly smooth (6′–12′ high); leaves pinnatifid and toothed, clasping; heads loosely corymbed. — Waste grounds, E. New England and New York. (Adv. from Eu.)

* * *Rays present: root perennial: heads corymbed.*

2. **S. aùreus,** L. (GOLDEN RAGWORT. SQUAW-WEED.) *Smooth, or floccose-woolly when young* (10′–30′ high); *root-leaves simple and rounded*, the larger mostly heart-shaped, crenate-toothed, *long-petioled; the lower stem-leaves lyre-shaped*, upper ones lanceolate, cut-pinnatifid, sessile or partly clasping; corymb umbel-like; rays 8–12. — Varies greatly, the leading forms being, — Var. 1. OBOVÀTUS, with the root-leaves round-obovate (growing in drier places). — Var. 2. BALSÁMITÆ, with the root-leaves oblong, spatulate, or lanceolate, sometimes cut-toothed, tapering into the petiole. Rocky places. — Var. 3. LANCEOLÀTUS, *Oakes*, with the leaves all lanceolate-oblong, thin, sharply and unequally toothed, either wedge-shaped or somewhat heart-shaped at the base, the upper merely pinnatifid-cut towards the base. (Cedar swamps, Vermont, *Robbins.*) — Common everywhere; the primary form in swamps. May, June.

3. **S. Ellióttii,** Torr. & Gr. Soon smooth, stem simple (1° high), often nearly leafless, bearing a small corymb; *root-leaves thickish, obovate or roundish, narrowed into a short and winged petiole, or sessile*, crenate-toothed, sometimes lyrate; stem-leaves small, cut-pinnatifid. — Rich soil, Virginia and southward along the mountains. May.

4. **S. tomentòsus,** Michx. (WOOLLY RAGWORT.) *Clothed with scarcely deciduous hoary wool* (1°–2° high); *root-leaves oblong*, obtuse, crenate-toothed, on slender petioles; the upper sessile; corymb flat-topped; rays 12–15. — Mountains of Penn. (*Pursh*), Virginia and southward. May.

S. CÀNUS, Hook., which too closely resembles the last, probably occurs within our Northwestern borders.

64. ÀRNICA, L. ARNICA.

Heads many-flowered, radiate; the rays pistillate. Scales of the bell-shaped involucre lanceolate, equal, somewhat in 2 rows. Receptacle flat, fimbrillate. Achenia spindle-shaped. Pappus a single row of rather rigid and strongly roughened-denticulate bristles. — Perennial herbs, chiefly of the mountains and cold northern regions, with simple stems, bearing single or corymbed large heads and opposite leaves. Flowers yellow. (Name thought to be a corruption of *Ptarmica.*)

1. **A. móllis,** Hook. Soft-hairy; *stem leafy* (1°–2° high), bearing 1 to 5 heads; *leaves thin, veiny*, smoothish when old, toothed; the upper *ovate-lanceolate*, closely sessile; the lower narrower, tapering into a margined petiole; scales of the involucre pointed; pappus almost plumose. — Alpine rivulets, &c., White Mountains of N. Hampshire and mountains of N. New York; thence northwestward. July.

2. **A. nudicaulis**, Ell. Hairy and rather glandular (1°-3° high); *leaves thickish*, 3-5-*nerved*, *ovate or oblong*, all sessile, mostly entire; those of the *naked stem* small and only 1 or 2 pairs; heads several, corymbed, showy.— Damp pine barrens, Virginia and southward. April, May.

65. CENTAURÈA, L. STAR-THISTLE.

Heads many-flowered; the flowers all tubular, the marginal mostly falsely radiate and larger, sterile. Receptacle bristly. Involucre imbricated, the scales margined or appendaged. Achenia compressed. Pappus wanting, or of a few bristles.—Herbs with alternate leaves and single heads. (Named from the *Centaur, Chiron.*)

1. **C.** CYANUS, L. (BLUEBOTTLE.) Scales of the globular involucre fringe-margined; *false rays large*, pappus very short; *leaves linear, entire*, or toothed at the base. ① — Road-sides, escaped from gardens. July.—Flowers blue, varying to purplish or white. (Adv. from Eu.)

2. **C.** NÌGRA, L. (KNAPWEED.) Scales of the globular involucre appendaged, and with a stiff black fringe; *rays wanting*; pappus very short; *leaves lanceolate*, or the lower lyrate-angled, rough. ♃ — Waste places, E. New England. Aug.—Flowers purple. (Adv. from Eu.)

3. C. CALCÍTRAPA, L. (STAR THISTLE.) Stem diffusely much branched; *leaves pinnately lobed* or spinulose-toothed; heads sessile, the middle *scales of the ovoid involucre spiny*; pappus none; flowers purple. ① —Norfolk, Virginia. (Adv. from Eu.)

C. AMERICÀNA, Nutt., a showy species of the Southwestern States,—the only one which belongs to this country,—is cultivated in gardens.

66. CNÌCUS, Vaill. BLESSED THISTLE.

Heads many-flowered; the ray-flowers tubular and sterile, shorter than the rest, which are all tubular and perfect. Scales of the ovoid involucre coriaceous, appressed, extended into a long and rigid pinnately spinose appendage. Receptacle clothed with capillary bristles. Achenia terete, short, strongly striate, crowned with 10 short and horny teeth, and bearing a pappus of 10 elongated rigid bristles, and 10 short bristles alternate with the last in an inner row.—An annual smoothish herb, with clasping scarcely pinnatifid-cut leaves and large bracted heads. Flowers yellow. (Name from κνίζω, *to prick.*)

1. **C.** BENEDÍCTUS, L.—Road-sides; scarcely naturalized. (Adv. from Eu.)

67. CÍRSIUM, Tourn. COMMON OR PLUMED THISTLE.

Heads many-flowered; the flowers all tubular, perfect and similar, or rarely imperfectly diœcious. Scales of the ovoid or spherical involucre imbricated in many rows, tipped with a point or prickle. Receptacle thickly clothed with soft bristles or hairs. Achenia oblong, flattish, not ribbed. Pappus of numerous bristles united into a ring at the base, plumose to the middle, deciduous.—

Herbs, with sessile alternate leaves, often pinnatifid, and prickly. Heads large, terminal. Flowers reddish-purple or cream-color. (Name from *κίρσος, a swelled vein*, for which the Thistle was a reputed remedy.)

* *Scales of the involucre all tipped with spreading prickles.*

1. **C. lanceolàtum,** Scop. (Common Thistle.) Leaves decurrent on the stem, forming prickly lobed wings, pinnatifid, rough and bristly above, woolly with decidous webby hairs beneath, prickly; flowers purple. ② — Pastures and road-sides, everywhere, at the North. (Nat. from Eu.)

* * *Scales of the involucre appressed; the inner ones not prickly: filaments hairy.*

+ *Leaves white-woolly beneath, and sometimes also above: outer scales of the involucre successively shorter, and tipped with short prickles.*

2. **C. Pitchèri,** Torr. & Gr. *White-woolly throughout*, low; stem stout, very leafy; *leaves all pinnately parted into rigid narrowly linear and elongated divisions,* with revolute margins; flowers cream-color. ♃ — Sandy shores of Lakes Michigan, Huron, and Superior.

3. **C. undulàtum,** Spreng. *White-woolly throughout,* low and stout, leafy; *leaves lanceolate-oblong,* partly clasping, *undulate-pinnatifid,* with prickly lobes; flowers reddish-purple. ② — Islands of L. Huron and Michigan; thence westward. July.

4. **C. discolor,** Spreng. Stem grooved, hairy, branched, leafy; *leaves all deeply pinnatifid,* sparingly hairy and *green above, whitened with close wool beneath;* the diverging *lobes 2-3-cleft, linear-lanceolate,* prickly-pointed; flowers pale purple. ② — Meadows and copses; not uncommon. Aug. — Plant 3°-6° high: heads 1′ or more in width.

5. **C. altissimum,** Spreng. Stem downy, branching, *leafy to the heads: leaves* roughish-hairy above, whitened with close wool beneath, *oblong-lanceolate, sinuate-toothed, undulate-pinnatifid, or undivided,* the lobes or teeth prickly, those from the base pinnatifid; *lobes short, oblong or triangular;* flowers chiefly purple. ♃? — Fields and copses, Penn. to Ohio, Illinois, and southward. Aug. Plant 3°-10° high: leaves variable: the heads much as in the last.

6. **C. Virginiànum,** Michx. Stem woolly, slender, simple or sparingly branched, the *branches or long peduncles naked: leaves lanceolate,* green above whitened with close wool beneath, ciliate with prickly bristles, *entire or sparingly sinuate-lobed,* sometimes the lower deeply sinuate-pinnatifid; outer scales of the involucre scarcely prickly; flowers purple. — Woods and plains, Virginia, Ohio, and southward. July. — Plant 1°-3° high; the heads seldom more than half as large as in the last.

Var. **filipéndulum.** Stem stouter, more leafy, corymbosely branched above; the heads on shorter peduncles; leaves pinnatifid; roots tuberous, enlarged below. (C. filipendulum, *Engelm.*) — Illinois and southwestward.

+ + *Leaves green both sides, or only with loose webby hairs underneath: scales of the involucre scarcely prickly-pointed.*

7. **C. mùticum,** Michx. (Swamp Thistle.) *Stem tall* (3°-8° high), angled, smoothish, panicled at the summit, the branches sparingly leafy and bearing single or few rather large *naked heads; leaves* somewhat hairy above,

whitened *with loose webby hairs beneath* when young, *deeply pinnatifid, the divisions lanceolate*, acute, cut-lobed, prickly-pointed; *scales of the webby and glutinous involucre* closely appressed, *pointless* or barely mucronate; flowers purple. ♃ — Swamps and low woods; common. Aug.

8. **C. pùmilum,** Spreng. (PASTURE THISTLE.) *Stem low* and stout (1°-3° high), hairy, bearing 1-3 very large *heads* (1½′ broad), which are *somewhat leafy-bracted* at the base; *leaves* lanceolate-oblong, partly clasping, *green, somewhat hairy, pinnatifid, with short and cut very prickly-margined lobes; outer scales* of the involucre *prickly-pointed*, the inner very slender; flowers purple or rarely white (fragrant, 2′ long). ② — Dry fields, Maine to Penn., near the coast. July.

9. **C. horridulum,** Michx. (YELLOW THISTLE.) *Stem stout* (1°-4° high), webby-haired when young; *leaves* partly clasping, green, soon smooth, lanceolate, *pinnatifid, the short toothed and cut lobes very spiny* with yellowish prickles; *heads* large (1′-1½′ broad), *surrounded at the base by an involucrate whorl of leaf-like and very prickly bracts,* which equal or exceed the narrow and *unarmed scales* of the involucre; flowers pale yellow, often turning purple in fading. — Sandy fields, &c., Massachusetts to Virginia, and southward, near the coast. June-Aug.

* * * *Outer scales of the appressed involucre barely prickly-pointed: filaments nearly smooth: heads imperfectly diœcious.*

10. **C.** ARVÉNSE, Scop. (CANADA THISTLE.) Low, branched; roots extensively creeping; leaves oblong or lanceolate, smooth, or slightly woolly beneath, sinuate-pinnatifid, prickly-margined; heads small and numerous; flowers rose-purple. ♃ — Cultivated fields and pastures; common at the North: a most troublesome weed, which it is extremely difficult to eradicate. July, Aug. (Nat. from Eu.)

68. CARDÙUS, Tourn. PLUMELESS THISTLE.

Bristles of the pappus naked (not plumose), merely rough or denticulate. Otherwise as in Cirsium. (The ancient Latin name.)

1. **C.** NÙTANS, L. (MUSK THISTLE.) Leaves decurrent, sinuate, spiny; heads solitary, drooping; flowers purple. ② — Fields near Harrisburg, Penn., *Prof. Porter.* (Adv. from Eu.)

69. ONOPÓRDON, Vaill. COTTON THISTLE.

Heads and flowers nearly as in Cirsium. Scales of the involucre coriaceous, tipped with a lanceolate prickly appendage. Receptacle deeply honeycombed. Achenia 4-angled, wrinkled transversely. Bristles of the pappus numerous, slender, not plumose, united at the base into a horny ring. — Coarse, branching herbs, with the stems winged by the decurrent base of the lobed and toothed somewhat prickly leaves. Heads large: flowers purple.

1. **O.** ACÁNTHIUM, L. Stem (2°-4° high) and leaves cotton-woolly; scales linear-awl-shaped. ① — Road-sides, New England. (Adv. from Eu.)

70. LÁPPA, Tourn. BURDOCK.

Heads many-flowered, the flowers all perfect and similar. Involucre globular; the imbricated scales coriaceous and appressed at the base, tipped with an abrupt and spreading awl-shaped hook-pointed appendage. Receptacle bristly. Achenia oblong, flattened, wrinkled transversely. Pappus short, of numerous rough bristles, not united at the base, deciduous. — Coarse biennial weeds, with very large unarmed heart-shaped and petioled leaves, the lower surface somewhat woolly. Heads small, solitary or clustered: flowers purple, rarely white. (Name from λαβεῖν, *to lay hold*, the involucre forming a hooked bur which holds tenaciously to the dress, or the fleece of animals.)

1. **L.** MÀJOR, Gærtn. (COMMON BURDOCK.) Upper leaves ovate, the lower heart-shaped; involucre smoothish. (Árctium Lappa, *L.*) — Waste places in rich soil, and around dwellings. — A variety with woolly heads (L. tomentosa, *Lam.*), rarely with pinnatifid leaves, is occasionally seen. (Nat. from Eu.)

SUBORDER II. LIGULIFLÒRÆ. (CICHORACEÆ.)

71. LÁMPSANA, Tourn. NIPPLE-WORT.

Heads 8–12-flowered. Scales of the cylindrical involucre 8, erect, in one row. Receptacle naked. Achenia oblong. Pappus none. — Slender branching herbs, with angled or toothed leaves, and loosely panicled small heads: flowers yellow. (Name from λάπτω, *to purge*. It should rather be *Lapsana*, as written by Linnæus.)

1. **L.** COMMÙNIS, L. Nearly smooth; lower leaves ovate, sometimes lyre-shaped. ① — Road-sides, near Boston. (Adv. from Eu.)

72. CICHÒRIUM, Tourn. SUCCORY or CICHORY.

Heads several-flowered. Involucre double; the outer of 5 short spreading scales, the inner of 8–10 scales. Achenia striate. Pappus of numerous very small chaffy scales, forming a short crown. — Branching perennials, with deep roots; the sessile heads 2 or 3 together, axillary and terminal. Flowers bright blue, showy. (Altered from the Arabian name of the plant.)

1. **C.** INTÝBUS, L. Stem-leaves oblong or lanceolate, partly clasping, the lowest runcinate, those of the rigid flowering branches minute. — Road-sides; common near the coast, especially in Mass. July–Oct. (Nat. from Eu.)

73. KRÍGIA, Schreber. DWARF DANDELION.

Heads 15–20-flowered. Scales of the involucre several, in about 2 rows. Achenia top-shaped, many-striate or angled. Pappus double; the outer of 5 broad and rounded chaffy scales; the inner of as many alternate slender bristles. — Small annuals or biennials, branched from the base; the leaves chiefly radical, lyrate or toothed, the small heads terminating the naked scapes or branches. Flowers yellow. (Named after *D. Krieg*, an early German botanical collector in this country.)

1. **K. Virginica,** Willd. Stems or scapes several, forking during the season (1′–10′ high); earlier leaves roundish, entire, the others narrower, often pinnatifid. — Var. DICHÓTOMA is a branched and leafy summer state. — New England to Virginia and southward, mostly near the coast. April – Aug.

74. CÝNTHIA, Don. CYNTHIA.

Heads many-flowered. Scales of the involucre several, somewhat in 2 rows. Achenia short, striate. Pappus double; the outer of numerous very small chaffy bristles; the inner of numerous capillary elongated bristles. — Low perennial herbs, nearly smooth and glaucous, with scattered or radical leaves; the scapes or naked peduncles (often bristly at the apex) bearing rather showy single heads. Flowers yellow. (Probably named after *Mount Cynthus.*)

1. **C. Virgínica,** Don. *Roots fibrous; stem-leaves* 1 – 2, oblong or lanceolate-spatulate, clasping, mostly entire; the radical ones on short winged petioles, often toothed, rarely pinnatifid; peduncles 2 – 5. — Moist banks, New York to Michigan and southward. June. — Stem 1° high, or more.

2. **C. Dandelion,** DC. *Scapes leafless,* from a *tuberous root* (6′–15′ high); leaves varying from spatulate-oblong to linear-lanceolate, entire or few-lobed. — Moist ground, Maryland to Kentucky, and southward. March – July.

75. LEÓNTODON, L., Juss. HAWKBIT. FALL DANDELION.

Heads many-flowered. Involucre scarcely imbricated, but with several bractlets at the base. Achenia spindle-shaped, striate, all alike. Pappus persistent, composed of plumose bristles which are enlarged and flattened towards the base. — Low and stemless perennials, with toothed or pinnatifid root-leaves, the scapes bearing one or more yellow heads. (Name from λέων, *a lion,* and ὀδούς, *a tooth,* in allusion to the toothed leaves.) — The following belongs to the subgenus OPORÍNIA, with a tawny pappus of a single row of equal bristles.

1. **L.** AUTUMNÀLE, L. (FALL DANDELION.) Leaves more or less pinnatifid; scape branched; peduncles thickened at the summit and furnished with small scaly bracts. Meadows and road-sides; common in E. New England Aug. - Oct. (Nat. from Eu.)

76. HIERÀCIUM, Tourn. HAWKWEED.

Heads many-flowered. Involucre more or less imbricated. Achenia oblong or columnar, striate, not beaked. Pappus a single row of tawny fragile capillary bristles. — Perennial herbs, with entire or toothed leaves, and single or panicled heads of yellow flowers. (Name from ἱέραξ, *a hawk.*)

* *Heads large and broad: involucre imbricated: achenia tapering towards the base.*

1. **H. Canadénse,** Michx. (CANADA HAWKWEED.) Stems simple, leafy, corymbed at the summit (1° – 3° high); leaves sessile, lanceolate or ovate-oblong, acute, remotely and very coarsely toothed, somewhat hairy, the uppermost slightly clasping. — Dry woods, Massachusetts to Michigan, and northward. Aug.

* * *Heads small: involucre cylindrical, scarcely imbricated.*

2. **H. scàbrum,** Michx. (ROUGH HAWKWEED.) Stem rather stout (1° - 3° high), leafy, *rough-hairy;* the stiff flexuous panicle at first racemose, at length rather corymbose; the thickish *peduncles and* the hoary 40 - 50-flowered *involucre densely clothed with dark glandular bristles; achenia columnar, not tapering at the summit;* leaves obovate or oval, nearly entire, hairy. — Dry open woods; common, especially northward. Aug.

3. **H. longipìlum,** Torr. (LONG-BEARDED HAWKWEED.) Stem wand-like, simple, stout (2° - 3° high), *very leafy towards the base, naked above,* and bearing a small racemed panicle; the lower portion and both sides of the oblong-lanceolate or spatulate entire leaves *thickly clothed with very long and upright bristles;* peduncles with the 20 - 30-flowered involucre glandular-bristly; *achenia spindle-shaped, narrowed at the apex.* — Prairies, Michigan to Illinois, and westward. Aug. — Heads intermediate between the last and the next. Bristles straight and even, as if combed, often 1′ long!

4. **H. Gronòvii,** L. (HAIRY HAWKWEED.) Stem wand-like, mostly simple, *leafy and very hairy below, naked above* and forming a long and narrow panicle; leaves oblong or obovate, nearly entire, hairy; the slender peduncles and the 20 - 30-flowered involucre sparingly glandular-bristly; *achenia spindle-shaped, with a very taper summit.* — Dry sterile soil; common, especially southward. Aug. — Varies from 1° - 4° high; with small heads and almost beaked fruit, which well distinguishes the largest forms from No. 2, and the smallest naked-stemmed states from the next.

5. **H. venòsum,** L. (RATTLESNAKE-WEED.) Stem or *scape naked or with a single leaf, smooth and slender, forking above into a spreading loose corymb;* root-leaves obovate or oblong, nearly entire, scarcely petioled, thin and pale, purplish and glaucous underneath (often hairy along the midrib), marked with purple veins; peduncles very slender; involucre 20-flowered; *achenia linear,* not tapering above. — Var. SUB'CAULÉSCENS has the stem more or less leafy next the base. — Dry plains and pine woods; common. — Plant 1° - 2° high.

6. **H. paniculàtum,** L. (PANICLED HAWKWEED.) *Stem slender, leafy, diffusely branched,* hairy below (2° - 3° high); leaves lanceolate, acute at both ends, slightly toothed, smooth; *heads* (very small) *in a loose panicle,* on slender diverging peduncles, 12 - 20-*flowered; achenia short,* not tapering at the summit. — Open woods; rather common.

77. NÁBALUS, Cass. RATTLESNAKE-ROOT.

Heads few - many-flowered. Involucre cylindrical, of 5 to 14 linear scales in a single row, and a few small bractlets at the base. Achenia linear-oblong, striate or grooved, not contracted at the apex. Pappus of copious straw-color or brownish roughish capillary bristles. — Perennial herbs, with upright leafy stems arising from spindle-shaped (extremely bitter) tubers, very variable leaves, and racemose-panicled mostly nodding heads. Flowers greenish-white or cream-color, often tinged with purple. (Name probably from *νάβλα, a harp,* in allusion to the lyrate leaves which these plants sometimes present.) Species of Prenánthes, *L.*

* *Involucre smooth or nearly so, 5 - 12-flowered.*

1. **N. álbus,** Hook. (WHITE LETTUCE. RATTLESNAKE-ROOT.) Smooth and glaucous (2° - 4° high); *stem corymbose-panicled at the summit:* leaves angulate or triangular-halberd-form, sinuate-toothed, or 3 - 5-cleft; the uppermost oblong and undivided; *involucre* (purplish) *of about* 8 *scales,* 8 - 12-*flowered; pappus deep cinnamon-color.* — Var. SERPENTÀRIA is a form with deeply divided leaves, their margins often rough-ciliate. — Borders of woods, in rich soil; common, especially northward. Aug. — Stouter and more corymbed than the next, with thickish leaves and often purplish branches. Heads ½′ long.

2. **N. altíssimus,** Hook. (TALL WHITE LETTUCE.) Smooth; stem tall and slender (3° - 6° high); the *heads in* small axillary and terminal loose clusters forming *a long and wand-like leafy panicle;* leaves membranaceous, all petioled, ovate, heart-shaped or triangular, and merely toothed or cleft, with naked or winged petioles, or frequently 3 - 5-parted, with the divisions entire or again cleft; *involucre slender* (greenish), *of* 5 *scales,* 5 - 6-*flowered; pappus dirty white,* or pale straw-color. — Rich moist woods; common, especially northward. Aug., Sept.

3. **N. Fràseri,** DC. (LION'S-FOOT. GALL-OF-THE-EARTH.) Nearly smooth; *stem corymbose-panicled* at the summit (1° - 4° high); leaves mostly deltoid, roughish; the lower variously 3 - 7-lobed, on margined petioles; the upper oblong-lanceolate, mostly undivided, nearly sessile; *involucre* (greenish or purplish, sometimes slightly bristly) *of about* 8 *scales,* 8 - 12-*flowered; pappus dull straw-color.* — Varies greatly in foliage: the var. INTEGRIFÒLIUS has the thickish leaves all undivided and merely toothed. — Dry sandy or sterile soil, S. New England to Virginia and southward. Sept.

4. **N. nànus,** DC. Smooth; *stem low and simple* (5′ - 10′ high); the heads in axillary clusters forming a narrow racemed panicle; leaves triangular-halberd-shaped and very variously lobed or cleft, on slender petioles; *involucre* (livid) 10 - 13-*flowered, of about* 8 *proper scales and several very short bract-like ones, which are triangular-ovate and appressed;* pappus dark straw-color. — Alpine summits of the White Mountains of New Hampshire, and Mount Marcy, New York. Aug. - Oct.

5. **N. Boóttii,** DC. *Stem simple, dwarf* (5′ - 6′ high), pubescent at the summit; the heads in an almost simple raceme; lowest leaves halberd-shaped or heart-shaped, the middle oblong, the upper lanceolate, nearly entire, tapering into a margined petiole; *involucre* (livid) 10 - 18-*flowered, of* 10 - 15 *very obtuse proper scales, and several linear and loose exterior ones nearly half the length* of the former; pappus straw-color. — Higher alpine summits of the mountains of Maine, New Hampshire, and N. New York. Aug.

6. **N. virgàtus,** DC. (SLENDER RATTLESNAKE-ROOT.) Smooth, slightly glaucous; *stem very simple* (2° - 4° high); *produced above into a naked and slender spiked raceme* (1½° - 2° long), the heads clustered and mostly unilateral; leaves lanceolate, acute, closely sessile, the upper reduced to bracts, the lower toothed or pinnatifid; *involucre* (purplish) *of about* 8 *scales,* 8 - 12-*flowered;* pappus straw-color. — Sandy pine barrens, New Jersey to Virginia, and southward. Sept.

* * *Involucre 12 - 40-flowered, hairy, as well as the peduncles.*

7. **N. racemòsus,** Hook. Stem wand-like, simple (2° - 5° high), *smooth,* as well as the oval or oblong-lanceolate denticulate leaves; the lower tapering into winged petioles (rarely cut-pinnatifid), the upper partly clasping; *heads* in clusters *crowded in a long and narrow interruptedly spiked panicle; involucre about 12-flowered;* pappus straw-color. — Plains, Ohio to Wisconsin, and northward. Also Hackensack marshes, New Jersey. Sept. — Flowers flesh-color.

8. **N. àsper,** Torr. & Gr. Stem wand-like, simple (2° - 4° high), *rough-pubescent,* as well as the oval-oblong or broadly lanceolate toothed leaves; *heads* in small clusters (mostly erect) disposed *in an oblong and narrow compound raceme; involucre 12 - 14-flowered;* pappus straw-color. — Dry prairies and barrens, Ohio to Illinois, and southward. Sept. — Flowers larger than No. 7, cream-color.

9. **N. crepidíneus,** DC. Somewhat smooth; stem stout (5° - 8° high), bearing numerous nodding *heads* in loose clusters on the *corymbose-panicled* branches; *leaves* large (6′ - 12′ long), *broadly triangular-ovate or halberd-form,* strongly toothed, contracted into winged petioles; *involucre 20 - 40-flowered;* pappus brown. — Rich soil, Ohio to Illinois and southward. Sept. — Involucre blackish; flowers cream-color.

78. TRÓXIMON, Nutt. TROXIMON.

Head many-flowered. Scales of the bell-shaped involucre ovate or lanceolate, pointed, loosely imbricated in 2 or 3 rows. Achenia smooth, 10-ribbed, not beaked. Pappus longer than the achenium, white, of copious and unequal rather rigid capillary bristles, some of the larger gradually thickened towards the base. — Perennial herbs, with linear elongated tufted root-leaves, and a simple naked scape. Heads solitary, large: flowers yellow. (Name from τρώξομαι, *to eat,* first applied to a plant with an edible root.)

1. **T. cuspidàtum,** Pursh. Leaves lanceolate, elongated, tapering to a sharp point, woolly on the margins; scales of the involucre lanceolate, sharp-pointed. — Prairies, Wisconsin (*Lapham*) and westward. April, May.

79. TARÁXACUM, Haller. DANDELION.

Head many-flowered. Involucre double, the outer of short scales; the inner of long linear scales, erect in a single row. Achenia oblong, ribbed, and roughened on the ribs, the apex prolonged into a very slender thread-like beak, bearing the pappus of copious soft and white capillary bristles. — Perennial herbs, producing a tuft of pinnatifid or runcinate radical leaves, and slender naked hollow scapes, bearing a single large head of yellow flowers. (Name from ταράσσω, *to disquiet or disorder,* in allusion to its medicinal properties.)

1. **T. Dens-leònis,** Desf. (COMMON DANDELION.) Smooth, or at first pubescent; outer involucre reflexed. — Pastures and fields everywhere: probably indigenous in the North. April - Sept. — After blossoming, the inner involucre closes, the slender beak elongates and raises up the pappus while the fruit is forming, the whole involucre is then reflexed, exposing to the wind the naked fruits, with the pappus displayed in an open globular head. (Eu.)

* *Involucre smooth or nearly so, 5 – 12-flowered.*

1. **N. álbus,** Hook. (White Lettuce. Rattlesnake-root.) Smooth and glaucous (2° – 4° high); *stem corymbose-panicled at the summit:* leaves angulate or triangular-halberd-form, sinuate-toothed, or 3 – 5-cleft; the uppermost oblong and undivided; *involucre* (purplish) *of about* 8 *scales*, 8 – 12-*flowered; pappus deep cinnamon-color.* — Var. Serpentària is a form with deeply divided leaves, their margins often rough-ciliate. — Borders of woods, in rich soil; common, especially northward. Aug. — Stouter and more corymbed than the next, with thickish leaves and often purplish branches. Heads ½′ long.

2. **N. altíssimus,** Hook. (Tall White Lettuce.) Smooth; stem tall and slender (3° – 6° high); the *heads in* small axillary and terminal loose clusters forming *a long and wand-like leafy panicle;* leaves membranaceous, all petioled, ovate, heart-shaped or triangular, and merely toothed or cleft, with naked or winged petioles, or frequently 3 – 5-parted, with the divisions entire or again cleft; *involucre slender* (greenish), *of* 5 *scales*, 5 – 6-*flowered; pappus dirty white*, or pale straw-color. — Rich moist woods; common, especially northward. Aug., Sept.

3. **N. Fràseri,** DC. (Lion's-foot. Gall-of-the-earth.) Nearly smooth; *stem corymbose-panicled* at the summit (1° – 4° high); leaves mostly deltoid, roughish; the lower variously 3 – 7-lobed, on margined petioles; the upper oblong-lanceolate, mostly undivided, nearly sessile; *involucre* (greenish or purplish, sometimes slightly bristly) *of about* 8 *scales*, 8 – 12-*flowered; pappus dull straw-color.* — Varies greatly in foliage: the var. integrifòlius has the thickish leaves all undivided and merely toothed. — Dry sandy or sterile soil, S. New England to Virginia and southward. Sept.

4. **N. nànus,** DC. Smooth; *stem low and simple* (5′ – 10′ high); the heads in axillary clusters forming a narrow racemed panicle; leaves triangular-halberd-shaped and very variously lobed or cleft, on slender petioles; *involucre* (livid) 10 – 13-*flowered, of about* 8 *proper scales and several very short bract-like ones, which are triangular-ovate and appressed;* pappus dark straw-color. — Alpine summits of the White Mountains of New Hampshire, and Mount Marcy, New York. Aug. – Oct.

5. **N. Boóttii,** DC. *Stem simple, dwarf* (5′ – 6′ high), pubescent at the summit; the heads in an almost simple raceme; lowest leaves halberd-shaped or heart-shaped, the middle oblong, the upper lanceolate, nearly entire, tapering into a margined petiole; *involucre* (livid) 10 – 18-*flowered, of* 10 – 15 *very obtuse proper scales, and several linear and loose exterior ones nearly half the length* of the former; pappus straw-color. — Higher alpine summits of the mountains of Maine, New Hampshire, and N. New York. Aug.

6. **N. virgàtus,** DC. (Slender Rattlesnake-root.) Smooth, slightly glaucous; *stem very simple* (2° – 4° high); *produced above into a naked and slender spiked raceme* (1½° – 2° long), the heads clustered and mostly unilateral; leaves lanceolate, acute, closely sessile, the upper reduced to bracts, the lower toothed or pinnatifid; *involucre* (purplish) *of about* 8 *scales*, 8 – 12-*flowered;* pappus straw-color. — Sandy pine barrens, New Jersey to Virginia, and southward. Sept.

* * *Involucre* 12 – 40-*flowered, hairy, as well as the peduncles.*

7. **N. racemòsus,** Hook. Stem wand-like, simple (2° – 5° high), *smooth*, as well as the oval or oblong-lanceolate denticulate leaves; the lower tapering into winged petioles (rarely cut-pinnatifid), the upper partly clasping; *heads* in clusters *crowded in a long and narrow interruptedly spiked panicle; involucre about* 12-*flowered;* pappus straw-color. — Plains, Ohio to Wisconsin, and northward. Also Hackensack marshes, New Jersey. Sept. — Flowers flesh-color.

8. **N. ásper,** Torr. & Gr. Stem wand-like, simple (2° – 4° high), *rough-pubescent*, as well as the oval-oblong or broadly lanceolate toothed leaves; *heads* in small clusters (mostly erect) disposed *in a long and narrow compound raceme; involucre* 12 – 14-*flowered;* pappus straw-color. — Dry prairies and barrens, Ohio to Illinois, and southward. Sept. — Flowers larger than No. 7, cream-color.

9. **N. crepidíneus,** DC. Somewhat smooth; stem stout (5° – 8° high), bearing numerous nodding *heads* in loose clusters on the *corymbose-panicled* branches; *leaves* large (6′ – 12′ long), *broadly triangular-ovate or halberd-form*, strongly toothed, contracted into winged petioles; *involucre* 20 – 40-*flowered;* pappus brown. — Rich soil, Ohio to Illinois and southward. Sept. — Involucre blackish; flowers cream-color.

78. TRÓXIMON, Nutt. TROXIMON.

Head many-flowered. Scales of the bell-shaped involucre ovate or lanceolate, pointed, loosely imbricated in 2 or 3 rows. Achenia smooth, 10-ribbed, not beaked. Pappus longer than the achenium, white, of copious and unequal rather rigid capillary bristles, some of the larger gradually thickened towards the base. — Perennial herbs, with linear elongated tufted root-leaves, and a simple naked scape. Heads solitary, large: flowers yellow. (Name from **τρώξομαι**, *to eat*, first applied to a plant with an edible root.)

1. **T. cuspidàtum,** Pursh. Leaves lanceolate, elongated, tapering to a sharp point, woolly on the margins; scales of the involucre lanceolate, sharp-pointed. — Prairies, Wisconsin (*Lapham*) and westward. April, May.

79. TARÁXACUM, Haller. DANDELION.

Head many-flowered. Involucre double, the outer of short scales; the inner of long linear scales, erect in a single row. Achenia oblong, ribbed, and roughened on the ribs, the apex prolonged into a very slender thread-like beak, bearing the pappus of copious soft and white capillary bristles. — Perennial herbs, producing a tuft of pinnatifid or runcinate radical leaves, and slender naked hollow scapes, bearing a single large head of yellow flowers. (Name from *ταράσσω*, *to disquiet or disorder*, in allusion to its medicinal properties.)

1. **T. Dens-leònis,** Desf. (COMMON DANDELION.) Smooth, or at first pubescent; outer involucre reflexed. — Pastures and fields everywhere: probably indigenous in the North. April – Sept. — After blossoming, the inner involucre closes, the slender beak elongates and raises up the pappus while the fruit is forming, the whole involucre is then reflexed, exposing to the wind the naked fruits, with the pappus displayed in an open globular head. (Eu.)

80. PYRRHOPÀPPUS, DC. False Dandelion.

Heads, &c. nearly as in Taraxacum; the soft pappus reddish or rusty-color, and with a villous ring at the top of the long beak. — Mostly annual or biennial herbs, often branching and leafy-stemmed. Heads solitary, pretty large, terminating the naked summit of the stem or branches. . Flowers deep yellow. (Name composed of *πυῤῥός*, *flame-colored*, and *παππός*, *pappus*.)

1. **P. Caroliniànus,** DC. Stem branching below (1° - 2° high), leaves oblong or lanceolate, entire, cut, or pinnatifid, the stem-leaves partly clasping. — Sandy fields, from Maryland southward. April - July.

81. LACTÙCA, Tourn. Lettuce.

Heads several-flowered. Scales of the involucre imbricated in 2 or more sets of unequal lengths. Achenia flat (compressed parallel to the scales of the involucre), abruptly contracted into a long thread-form beak, bearing a copious and fugacious pappus of very soft and white capillary bristles. — Leafy-stemmed herbs, with panicled heads; the flowers of variable color. (The ancient name of the Lettuce, *L. sativa;* from *lac*, milk, in allusion to the milky juice.)

1. **L. elongàta,** Muhl. (Wild Lettuce.) Stem tall and stout (2° - 9° high, hollow); leaves partly clasping, pale beneath; the upper lanceolate and entire; the lower runcinate-pinnatifid; heads in a long and narrow naked panicle; achenia oval; flowers pale yellow, varying to purple. — Varies greatly; the leading form smooth or nearly so, with long leaves: — the var. INTEGRIFÒLIA is mostly smooth, with the leaves nearly all entire, and the flowers yellow or bluish (L. integrifolia, *Bigel.*): — the var. SANGUÍNEA is smaller, mostly hairy, and with runcinate leaves, and the flowers very variously colored (L. sanguinea, *Bigel.*). — Rich damp soil, borders of thickets, &c. July - Sept.

82. MULGÈDIUM, Cass. False or Blue Lettuce.

Heads many-flowered. Involucre, &c. as in Lactuca. Achenia laterally compressed, striate or ribbed, the summit contracted into a short and thick beak or neck, of the same texture, expanded at the apex into a ciliate disk, which bears a copious rather deciduous pappus of soft capillary bristles. — Leafy-stemmed herbs, with the general aspect and foliage of Lactuca. Heads racemed or panicled; the flowers chiefly blue. (Name from *mulgeo*, to milk.)

* *Pappus bright white: flowers blue.*

1. **M. acuminàtum,** DC. Smooth, panicled above (3° - 6° high); *stem-leaves ovate* and ovate-lanceolate, *pointed, merely toothed,* sometimes hairy on the midrib beneath, contracted at the base into a winged petiole; the lowest often sinuate; heads loosely panicled. ② — Borders of thickets, New York to Illinois, and southward. — Probably only a state of the next.

2. **M. Floridànum,** DC. Nearly smooth (3° - 6° high); *leaves all lyrate or runcinate,* the divisions sharply toothed; heads in a loose compound panicle. ② — Varies with the upper leaves clasping by a heart-shaped base, &c. Rich soil, Virginia and Ohio to Illinois, and southward. Aug.

* * *Pappus tawny: corolla pale blue, or cream-color turning bluish.*

3. **M. leucophæum,** DC. Nearly smooth; stem tall (3° - 12° high), very leafy; leaves irregularly pinnatifid, sometimes runcinate, coarsely toothed, the uppermost often undivided; heads in a large and dense compound panicle ② — Low grounds; common. Aug. — Lower leaves often 1° long.

M. PULCHÉLLUM, Nutt., of the plains of the Northwest, is to be expected in Wisconsin.

83. SÓNCHUS, L. SOW-THISTLE.

Heads many-flowered, becoming tumid at the base. Involucre more or less imbricated. Achenia flattened laterally, ribbed or striate, not beaked. Pappus copious, of very white exceedingly soft and fine capillary bristles. — Leafy-stemmed weeds, chiefly smooth and glaucous, with corymbed or umbellate heads of yellow flowers. (The ancient Greek name.)

* *Annual: flowers pale yellow.*

1. **S.** OLERÀCEUS, L. (COMMON SOW-THISTLE.) Stem-leaves runcinate-pinnatifid, or rarely undivided, slightly toothed with soft spiny teeth, clasping by a heart-shaped base, the auricles acute; involucre downy when young; *achenia striate, wrinkled transversely.* — Waste places in manured soil and around dwellings. (Nat. from Eu.)

2. **S.** ÁSPER, Vill. (SPINY-LEAVED SOW-THISTLE.) Stem-leaves mostly undivided, conspicuously spiny-toothed, the auricles of the clasping base rounded; *achenia margined, 3-nerved on each side, smooth.* — Waste places, like the last, and much resembling it. (Nat. from Eu.)

* * *Perennial: flowers bright yellow. (Heads large.)*

3. **S.** ARVÉNSIS, L. (CORN SOW-THISTLE.) Leaves runcinate-pinnatifid, spiny-toothed, clasping by a heart-shaped base, the auricles obtuse; peduncles and involucre bristly; achenia transversely wrinkled on the ribs. — Essex County, Massachusetts, Staten Island, and New Jersey: rare. Sept. (Adv. from Eu.)

ORDER 60. LOBELIÀCEÆ. (LOBELIA FAMILY.)

Herbs, with milky juice, alternate leaves, and scattered flowers, an irregular monopetalous 5-lobed corolla split down to the base on one side: the 5 stamens free from the corolla, and united into a tube commonly by their filaments and always by their anthers. — Calyx-tube adherent to the many-seeded pod. Style 1: stigma fringed. Seeds anatropous, with a small straight embryo, in copious albumen. — A family of acrid poisonous plants, represented only by the genus

1. LOBÈLIA, L. LOBELIA.

Calyx 5-cleft, with a short tube. Corolla with a straight tube, split down on the upper side, somewhat 2-lipped; the upper lip of 2 rather erect lobes, the lower spreading and 3-cleft. Two of the anthers in our species bearded at the top. Pod 2-celled, many-seeded, opening at the top. — Flowers axillary or chiefly in bracted racemes. (Dedicated to *Lobel*, an early Flemish herbalist.)

* *Flowers deep red, large: stem simple.*

1. **L. cardinàlis,** L. (Cardinal-flower.) Tall (2°–4° high), smoothish; leaves oblong-lanceolate, slightly toothed; raceme elongated, rather 1-sided; the pedicels much shorter than the leaf-like bracts. — Low grounds; common. July–Oct. — Perennial by offsets, with large and very showy intensely red flowers, — rarely varying to rose-color! (Plymouth, *Mr. Gilbert*), or even to white!

* * *Flowers blue, or blue variegated with white.*

+ *Stems leafy to the top, simple* (1°–3° *high*): *leaves oblong or ovate-lanceolate: sinuses of the calyx with conspicuous deflexed auricles: flowers crowded in a long spike or dense raceme.*

2. **L. syphilìtica,** L. (Great Lobelia.) *Somewhat hairy; leaves thin, acute at both ends* (2′–6′ long), irregularly serrate; flowers (nearly 1′ long) pedicelled, longer than the leafy bracts; calyx hirsute, the lobes half the length of the corolla, the short *tube hemispherical.* ♃ — Low grounds; common. Aug., Sept. — Flowers light blue, rarely white.

3. **L. pubérula,** Michx. *Finely soft-pubescent; leaves thickish, obtuse* (1′–2′ long), with small glandular teeth; spike rather 1-sided; *calyx-lobes* (*and ovate bracts*) *little shorter than the corolla, the hairy tube top-shaped.* ♃ — Moist grounds, New Jersey to Ohio and southward. Aug. — Corolla bright blue, ½′ long.

4. **L. leptostàchys,** A. DC. *Smooth* above; *leaves obtuse, denticulate,* oblong-lanceolate, the upper gradually reduced to awl-shaped bracts; raceme spike-like, long and dense; lobes of the calyx nearly equalling the corolla, the *auricles* in the form of 10 *awl-shaped appendages as long as the hemispherical tube.* ♃ — Sandy soil, Illinois and southward. July, Aug. — Corolla 3″–4″ long.

+ + *Stems leafy, mostly simple* (1°–2½° *high*): *leaves lanceolate or oblong-lanceolate: calyx-tube hemispherical, the sinuses destitute of auricles: flowers pretty large* (¾′–1′ *long*) *and showy, in a loose nearly* 1-*sided raceme: anthers sometimes bearded on the back.*

5. **L. glandulòsa,** Walt. Sparingly hairy or pubescent; leaves, bracts, and usually the lobes of the calyx *strongly glandular-toothed; calyx-tube densely hispid,* rarely sparsely so, or smoothish. ♃ — Moist places, Virginia and southward. Aug., Sept.

6. **L. amœ̀na,** Michx. *Glabrous* (rarely minutely pubescent); leaves and bracts scarcely glandular-toothed; *calyx-lobes entire and slender.* ♃ — Shady moist places, Virginia and southward. Sept.

+ + + *Stems leafy: calyx-tube ovoid or tapering to an acute base, no auricles or appendages at the sinuses: flowers small* (¼′–½′ *long*), *racemed.*

++ *Paniculately much branched: racemes leafy: root annual or biennial.*

7. **L. inflàta,** L. (Indian Tobacco.) Somewhat pubescent (9′–18′ high); leaves oblong or ovate-lanceolate, toothed; lobes of the calyx equalling the corolla (2″–3″ long), the tube and the inflated pod ovoid. — Dry open soil; common. July–Sept. — A virulent poison and quack medicine.

++ ++ *Simple or sparingly panicled, slender: leaves entire or nearly so, the upper reduced to linear or awl-shaped bracts: root perennial or biennial.*

8. **L. spicàta,** Lam. Minutely pubescent; stem wand-like, simple (1°-3° high); *stem-leaves obovate- or lanceolate-oblong; raceme long and spike-like,* commonly dense. (L. Claytoniana, *Michx.*) — Dry grounds, Massachusetts to Wisconsin, and southward. Aug. — Flowers pale blue.

9. **L. Nuttállii,** Rœm. & Sch. Stem *very slender* (1°-2° high), minutely roughened, *mostly simple; root-leaves obovate;* those of the stem oblong-linear; flowers loosely scattered in a small wand-like raceme; the thread-form *pedicels longer than the bract, shorter than the flower,* usually with minute *bractlets near the base;* lobes of the calyx short, awl-shaped. — Sandy swamps, Long Island, New Jersey, and southward. July - Sept. Much resembles the next.

10. **L. Kálmii,** L. Stem *slender, branching* (4′-18′ high), smooth; *root-leaves oblong-spatulate; those of the stem linear;* raceme loose, few-flowered; *pedicels shorter than the linear leaf-like bracts, longer than the flower,* with 2 minute *bractlets above the middle.* — Damp limestone rocks and banks, W. New England to Wisconsin along the Great Lakes. July - Sept.

+ + + + *Stem simple and nearly leafless, except at or near the base: flowers in a simple loose raceme: leaves fleshy: calyx-tube acute at the base; auricles none.*

11. **L. paludòsa,** Nutt. Nearly smooth; stem slender (1°-2½° high); *leaves thickish but flat, scattered near the base, linear-spatulate* or oblong-linear, denticulate, mostly tapering into a petiole; lower lip of the corolla bearded in the middle. ♃ — Bogs, Delaware and southward. — Flowers ½′ long, light blue.

12. **L. Dortmánna,** L. (WATER LOBELIA.) Very smooth; *scape thickish* (5′-12′ high), *few-flowered; leaves all tufted at the root, linear, terete, hollow,* with a partition lengthwise, sessile; lower lip of the pale-blue corolla slightly hairy. ♃ — Borders of ponds, New York, New England, and northward. July - Sept. — Flowers ½′-¾′ long. Summit of the pod free from the calyx. (Eu.)

ORDER 61. CAMPANULÀCEÆ. (CAMPANULA FAMILY.)

Herbs, with milky juice, alternate leaves, and scattered flowers; the calyx adherent to the ovary; the regular 5-lobed corolla bell-shaped, valvate in the bud; the 5 stamens free from the corolla and usually distinct. — Style 1, beset with collecting hairs above: stigmas 2 or more. Pod 2-several-celled, many-seeded. Seed small, anatropous, with a straight embryo in fleshy albumen. — Flowers generally blue and showy. — Sparingly represented in America, in the Northern States by only two genera.

1. CAMPÁNULA, Tourn. BELLFLOWER.

Calyx 5-cleft. Corolla generally bell-shaped, 5-lobed. Stamens 5, separate, the filaments broad and membranaceous at the base. Stigmas and cells of the pod 3 in our species, the short pod opening on the sides by as many valves or holes. — Herbs with terminal or axillary flowers. (A diminutive of the Italian *campana,* a bell, from the shape of the corolla.)

* *Flowers panicled (or rarely solitary), long-peduncled: pods nodding.*

1. **C. rotundifòlia,** L. (HAREBELL.) Slender, branching (5'–12' high), 1–10-flowered; *root-leaves round-heart-shaped* or ovate, mostly toothed or crenate, long-petioled, early withering away; *stem-leaves* numerous, *linear or narrowly lanceolate, entire, smooth; calyx-lobes awl-shaped,* varying from ⅓ to ⅔ the length of the bright-blue corolla. ♃ — Rocky shaded banks; common northward, and along the mountains. July. — A delicate and pretty, but variable species, with a most inappropriate name, since the round root-leaves are rarely conspicuous. Corolla ½'–¾' long. (Eu.)

Var. **linifòlia.** Stems more upright and rather rigid; the lowest leaves varying from heart-shaped to ovate-lanceolate; corolla ¾'–1' long. (C. linifolia, *Lam.*) — Shore of Lake Huron, Lake Superior, and northwestward. (Eu.)

2. **C. aparinoìdes,** Pursh. (MARSH BELLFLOWER.) *Stem simple and slender, weak* (8'–20' high), few-flowered, somewhat 3-angled, *rough backwards on the angles, as are the* slightly toothed *edges and midrib of the linear-lanceolate leaves; peduncles diverging,* slender; *lobes of the calyx triangular,* half the length of the bell-shaped (nearly white) corolla. ♃? (C. erinoìdes, *Muhl.*) — Bogs and wet meadows, among high grass. July. — Plant with somewhat the habit of a Galium; the corolla barely ¼' long.

3. **C. divaricàta,** Michx. Very smooth; stem loosely branched (1°–3° high); *leaves oblong-lanceolate,* pointed at both ends, *coarsely and sharply toothed; flowers numerous* on the branches of the large compound panicle, *calyx-lobes awl-shaped,* about half the length of the pale-blue small (¼') corolla; *style protruded.* ♃ — Dry woods and rocks, mountains of Virginia, Kentucky, and southward. July – Sept.

* * *Flowers numerous, nearly sessile, crowded in a long more or less leafy spike: corolla almost wheel-shaped, deeply 5-lobed: pods erect.*

4. **C. Americàna,** L. (TALL BELLFLOWER.) Stem mostly simple (3°–6° high); leaves ovate and ovate-lanceolate, taper-pointed, serrate, mostly on margined petioles, thin, somewhat hairy (2½'–6' long); the slender style protruded and curved. ♃ — Moist rich soil, New York to Wisconsin, and southward. July. — Spike 1°–2° long. Corolla blue, 1' broad.

C. MÈDIUM, L., the CANTERBURY BELLS, and some other species, are common in gardens. C. GLOMERÀTA, L., has escaped from gardens at Danvers, Mass.

2. SPECULÀRIA, Heist. VENUS'S LOOKING-GLASS.

Calyx 5- (or 3–4-) lobed. Corolla wheel-shaped, 5-lobed. Stamens 5, separate; the membranaceous hairy filaments shorter than the anthers. Stigmas 3. Pod prismatic or elongated-oblong, 3-celled, opening by 3 small lateral valves. — Low annuals; the lower flowers in the American species (§ TRIODALLUS, Raf.) fruiting precociously in the bud, without expanding their imperfect corolla. (Name from *Speculum Veneris,* the early name of the common European species.)

1. **S. perfoliàta,** A. DC. Somewhat hairy; leaves roundish or ovate, clasping by the heart-shaped base, toothed; flowers sessile, solitary or 2-3 together in the axils; the upper and later ones only with a conspicuous expanding (purple-blue) corolla; pod oblong, opening rather below the middle. — Dry hills or open fields; common. May-Aug.

ORDER 62. ERICÀCEÆ. (HEATH FAMILY.)

Shrubs, sometimes herbs, with the flowers regular or nearly so: the stamens as many or twice as many as the 4-5-lobed or 4-5-petalled corolla, free from but inserted with it: anthers 2-celled, commonly appendaged or opening by terminal chinks or pores: style 1: *ovary* 3-10-*celled.* Seeds small, anatropous. Embryo small, or sometimes minute, in fleshy albumen. — A large family, very various in many of the characters, comprising four well-marked suborders, as follows: —

SUBORDER I. VACCINIEÆ. THE WHORTLEBERRY FAMILY.

Calyx-tube adherent to the ovary, which forms an edible berry or berry-like fruit, crowned with the short calyx-teeth. Anthers 2-parted. Pollen compound (of 4 united grains). — Shrubs or somewhat woody plants, with scaly buds.

1. **GAYLUSSACIA.** Ovary 8-10-celled, with a single ovule in each cell. Fruit a berried drupe with 8-10 small nutlets.
2. **VACCINIUM.** Berry 4-5-celled (or imperfectly 8-10-celled by false partitions), many-seeded. Anther-cells tapering upward into a tube.
3. **CHIOGENES.** Berry 4-celled, many-seeded, its summit free. Anther-cells not prolonged into a tube, but each 2-pointed.

SUBORDER II. ERICINEÆ. THE PROPER HEATH FAMILY.

Calyx free from the ovary. Corolla monopetalous, or rarely nearly or quite polypetalous, hypogynous. Pollen of 4 united grains. — Shrubs or small trees.

TRIBE I. **ARBUTEÆ.** Fruit indehiscent, a berry or drupe. Corolla deciduous.

4. **ARCTOSTAPHYLOS.** Corolla urn-shaped. Drupe berry-like, 5-10-seeded.

TRIBE II. **ANDROMEDEÆ.** Fruit a pod opening loculicidally. Corolla deciduous.

* Anthers upright in the bud, the cells opening lengthwise. Corolla salver-shaped.

5. **EPIGÆA.** Calyx of 5 separate dry and pointed sepals. Anthers not appendaged.

* * Anthers upright in the bud, opening only at the top. Corolla monopetalous, either globular, urn-shaped, bell-shaped, or cylindrical.

+ Calyx enlarged and berry-like in fruit.

6. **GAULTHERIA.** Calyx 5-cleft, in fruit enclosing the small many-seeded pod. Anthers 4-awned at the top.

+ + Calyx dry, not becoming fleshy after flowering.

7. **LEUCOTHOE.** Calyx imbricated in the bud. Corolla cylindraceous, 5-toothed. Pod depressed, 5-lobed, the valves entire.
8. **CASSANDRA.** Calyx imbricated. Corolla cylindraceous, 5-toothed. Pod splitting when ripe into an outer and inner layer, the inner of 10 valves.

9. CASSIOPE. Calyx imbricated. Corolla broadly campanulate, deeply 4-5-cleft. Pod globular-ovoid, 4-5-valved, the valves 2-cleft.

10. ANDROMEDA. Calyx valvate and very early open in the bud. Pod globular. Seeds mostly hanging

11. OXYDENDRUM. Calyx valvate and opening early in the bud. Pod oblong-pyramidal. Seeds all ascending.

* * * Anthers turned over outwardly in the bud, afterwards upright; the cells opening only by a hole at the top. Corolla of 5 separate petals.

12. CLETHRA. Sepals 5. Stamens 10. Style 3-cleft at the apex. Pod 3-valved.

TRIBE III. **RHODOREÆ.** Fruit a pod opening septicidally. Corolla deciduous

* Anther-cells opening by a pore at the top.

+ Flowers not from scaly buds; the bracts leaf-like or coriaceous.

13. PHYLLODOCE. Corolla ovate or urn-shaped. Leaves narrow and heath-like.

14. KALMIA. Corolla broadly bell-shaped or wheel-shaped, with 10 pouches. Leaves broad.

+ + Flowers developed from large scaly buds, the scales or bracts caducous.

15. MENZIESIA. Corolla globular-bell-shaped, 4-toothed. Stamens 8. Leaves deciduous.

16. AZALEA. Corolla open funnel-form, 5-lobed. Stamens 5. Leaves deciduous.

17. RHODODENDRON. Corolla bell-shaped or short funnel-form, 5-lobed. Stamens 10. Leaves evergreen.

18. RHODORA. Corolla irregular, ringent, two of the petals nearly separate from the rest. Stamens 10. Leaves deciduous.

19. LEDUM. Corolla regular, of 5 nearly distinct petals. Leaves evergreen.

* * Anther-cells opening lengthwise. Buds not scaly. Leaves evergreen.

20. LOISELEURIA. Corolla deeply 5-cleft. Stamens 5, included.

21. LEIOPHYLLUM. Corolla of 5 separate petals. Stamens 10, exserted.

SUBORDER III. PYROLEÆ. THE PYROLA FAMILY.

Calyx free from the ovary. Corolla of 5 distinct petals. Pollen, &c. as in the preceding. Seeds with a very loose and translucent cellular covering much larger than the nucleus.—Nearly herbaceous; with evergreen foliage.

22. PYROLA. Flowers in a raceme. Petals not spreading. Filaments awl-shaped: anthers scarcely 2-horned. Style long. Valves of the pod cobwebby on the edges.

23. MONESES. Flower single. Petals widely spreading. Filaments not dilated in the middle: anthers conspicuously 2-horned. Style straight, exserted: stigmas 5, radiate. Valves of the pod smooth on the edges.

24. CHIMAPHILA. Flowers corymbed or umbelled. Petals widely spreading. Filaments dilated in the middle. Style very short and top-shaped, covered by a broad and orbicular stigma. Valves of the pod smooth on the edges.

SUBORDER IV. MONOTROPEÆ. THE INDIAN-PIPE FAMILY.

Flowers nearly as in Suborders II. or III., but the plants herbaceous and entirely destitute of green foliage, and with the aspect of Beechdrops. Seeds as in Suborder III. Pollen simple.

* Corolla monopetalous: anthers 2-celled.

25. PTEROSPORA. Corolla ovate, 5-toothed, withering-persistent. Anthers 2-horned on the back, opening lengthwise.

26. SCHWEINITZIA. Corolla broadly bell-shaped, 5-lobed. Anthers opening at the top.

* * Corolla of 4 or 5 separate petals: calyx imperfect or bract-like.

27. MONOTROPA. Petals narrow. Anthers kidney-shaped, opening across the top.

SUBORDER I. VACCINIÈÆ. THE WHORTLEBERRY FAMILY.

1. GAYLUSSÁCIA, H. B. K. HUCKLEBERRY.

Corolla tubular, ovoid, or bell-shaped; the border 5-cleft. Stamens 10: anthers awnless; the cells tapering upward into more or less of a tube, opening by a chink at the end. Fruit a berry-like drupe containing 10 seed-like nutlets. — Branching shrubs, with the aspect of Vaccínium, commonly sprinkled with resinous dots; the flowers (white tinged with purple or red) in lateral and bracted racemes. (Named for the distinguished chemist, *Gay-Lussac.*)

* *Leaves thick and evergreen, not resinous-dotted.*

1. **G. brachýcera,** Gray. (BOX-LEAVED HUCKLEBERRY.) Very smooth (1° high); leaves oval, finely crenate-toothed; racemes short and nearly sessile; pedicels very short; corolla cylindrical-bell-shaped. — Dry woods, Perry County, Penn., near Bloomfield (*Prof. Baird*), and mountains of Virginia. May. — Leaves in shape and aspect like those of the Box.

* * *Leaves deciduous, entire, sprinkled more or less with resinous or waxy atoms.*

2. **G. dumòsa,** Torr. & Gr. (DWARF HUCKLEBERRY.) *Somewhat hairy* and glandular, low (1° high from a creeping base). bushy; *leaves* obovate-oblong, *mucronate, green both sides,* rather thick and shining when old; racemes elongated; *bracts leaf-like, oval, persistent, as long as the pedicels; ovary bristly or glandular;* corolla bell-shaped; fruit black (insipid). — Var. HIRTÉLLA has the young branchlets, racemes, and often the leaves hairy. — Sandy low soil, Maine to Virginia, near the coast, and southward. June.

3. **G. frondòsa,** Torr. & Gr. (BLUE TANGLE. DANGLEBERRY.) *Smooth* (3°–6° high); branches slender and divergent; *leaves* obovate-oblong, blunt, *pale, glaucous beneath;* racemes slender, loose; *bracts oblong or linear, deciduous, shorter than the slender drooping pedicels;* corolla globular-bell-shaped; fruit dark blue with a white bloom (sweet and edible). — Low copses, coast of New England to Kentucky, and southward. May, June.

4. **G. resinòsa,** Torr. & Gr. (BLACK HUCKLEBERRY.) Much branched, rigid, *slightly pubescent* when young (1°–3° high); *leaves* oval, oblong-ovate, or oblong, thickly clothed and at first *clammy, as well as the flowers, with shining resinous globules;* racemes short, clustered, one-sided; pedicels about the length of the flowers; *bracts and bractlets* (*reddish*) *small and deciduous;* corolla ovoid-conical, or at length cylindrical with an open mouth; fruit black, without bloom (pleasant). — Woodlands and swamps; common. May, June. — The common *Huckleberry* of the North. It is said sometimes to occur with white fruit.

2. VACCÍNIUM, L. CRANBERRY. BLUEBERRY. BILBERRY.

Corolla bell-shaped, urn-shaped, or cylindrical; the limb 4–5-cleft, revolute. Stamens 8 or 10: anthers sometimes 2-awned on the back; the cells separate and prolonged into a tube, opening by a hole at the apex. Berry 4–5-celled, many-seeded, or sometimes 8–10-celled by a false partition stretching from the back of each cell to the placenta. — Shrubs with solitary, clustered, or racemed flowers: the corolla white or reddish. (An ancient Latin name, of obscure derivation.)

§ 1. OXYCÓCCUS, Tourn. — *Ovary 4-celled: corolla 4-parted, the long and narrow divisions revolute: anthers 8, awnless, tapering upwards into very long tubes pedicels slender.*

* *Stems very slender, creeping or trailing; leaves small, entire, whitened beneath, evergreen: pedicels erect, with the pale rose-colored flower nodding on their summit: corolla deeply 4-parted: berries red, acid.*

1. **V. Oxycóccus,** L. (SMALL CRANBERRY.) Stems very slender (4′–9′ long); *leaves ovate, acute, with strongly revolute margins* (2″–3″ long); pedicels 1–4, terminal; filaments more than half the length of the anthers. (Oxycoccus vulgaris, *Pursh.*) — Peat-bogs, New England and Penn. to Wisconsin, and northward. June. — Berry 3″–4″ broad, spotted when young, seldom sufficiently abundant to be gathered for the market. (Eu.)

2. **V. macrocárpon,** Ait. (COMMON AMERICAN CRANBERRY.) Stems elongated (1°–3° long), the flowering branches ascending; *leaves oblong, obtuse,* glaucous underneath, less revolute (4″–6″ long); pedicels several, becoming lateral; filaments scarcely one third the length of the anthers. (O. macrocárpus, *Pers.*) — Peat-bogs, Virginia to Wisconsin, and everywhere northward. June. — Berry ½′–1′ long.

* * *Stem upright and leaves deciduous, as in common Blueberries: flowers axillary and solitary: corolla deeply 4-cleft: berries turning purple, insipid.*

3. **V. erythrocárpon,** Michx. Smooth, divergently branched (1°–4° high); leaves oblong-lanceolate, taper-pointed, bristly serrate, thin. — Wooded hills, mountains of Virginia and southward. July.

§ 2. VITIS-IDÆA, Tourn. — *Ovary 4–5-celled: corolla bell-shaped, 4–5-lobed: anthers* 8–10, *awnless: filaments hairy: flowers in short and bracted nodding racemes: leaves evergreen: berries red or purple.*

4. **V. Vitis-Idæa,** L. (COWBERRY.) Low (6′–10′ high); branches erect from tufted creeping stems; leaves obovate, with revolute margins, dark green, smooth and shining above, dotted with blackish bristly points underneath; corolla bell-shaped, 4-cleft. — Higher mountains of New England, also on the coast of Maine, and at Danvers, Massachusetts (*Oakes*), and northward. June. — Berries dark red, acid and rather bitter, mealy, barely edible. (Eu.)

§ 3. BATODÉNDRON. — *Ovary more or less completely* 10-*celled by false partitions: corolla spreading-campanulate, 5-lobed: anthers 2-awned on the back: filaments hairy: berries mawkish and scarcely edible, ripening few seeds: flowers solitary on slender pedicels in the axils of the upper leaves, forming a sort of leafy racemes.*

5. **V. stamineum,** L. (DEERBERRY. SQUAW HUCKLEBERRY.) Diffusely branched (2°–3° high), somewhat pubescent; leaves ovate or oval, pale, whitish underneath, deciduous; tubes of the anthers much longer than the corolla, short-awned; berries globular or pear-shaped, greenish. — Dry woods, Maine to Michigan, and southward. May, June.

(**V.** ARBÓREUM, Michx., the FARKLE-BERRY, a tall species of this section, with evergreen leaves, probably extends northward into Virginia.)

§ 4. EUVACCÍNIUM. — *Ovary 4–5-celled, with no traces of false partitions: corolla urn-shaped or globular, 4–5-toothed: anthers 2-awned on the back: filaments smooth: flowers axillary, solitary, or 2–3 together: berries blue or black: northern alpine plants, with deciduous leaves.*

6. **V. cæspitòsum,** Michx. (DWARF BILBERRY.) Dwarf (3′–5′ high), tufted; *leaves* obovate, narrowed at the base, membranaceous, smooth and *shining, serrate;* flowers solitary on short peduncles; *corolla oblong,* slightly urn-shaped: *stamens* 10. — Alpine region of the White Mountains, New Hampshire; and high northward.

7. **V. uliginòsum,** L. (BOG BILBERRY.) Low and spreading (4′–8′ high), tufted; *leaves entire, dull,* obovate or oblong, pale and slightly pubescent underneath; flowers single or 2–3 together from a scaly bud, almost sessile; *corolla short, urn-shaped; stamens chiefly* 8. — Alpine tops of the high mountains of New England and New York, and northward. (Eu.)

§ 5. CYANOCÓCCUS. — *Ovary more or less completely* 10-*celled by false partitions: corolla oblong-cylindrical or slightly urn-shaped, 5-toothed: anthers* 10, *awnless: filaments hairy: berries blue or black with a bloom (sweet): flowers in clusters or very short racemes from scaly buds separate from and rather preceding the leaves, on short pedicels, appearing in early spring. (Leaves deciduous in the Northern species or proper Blueberries.)*

8. **V. Pennsylvánicum,** Lam. (DWARF BLUEBERRY.) Dwarf (6′–15′ high), smooth; *leaves lanceolate or oblong, distinctly serrulate with bristle-pointed teeth, smooth and shining both sides* (or sometimes downy on the midrib underneath); corolla short, cylindrical-bell-shaped. — Var. ANGUSTIFÒLIUM is a high mountain or boreal form, 3′–6′ high, with narrower lanceolate leaves. (V. angustifolium, *Ait.*) — Dry hills and woods; common from Penn. far northward. — Branches green, angled, warty. Berries abundant, large and sweet, ripening early in July: the earliest *blueberry* or *blue huckleberry* in the market.

9. **V. Canadénse,** Kalm. (CANADA BLUEBERRY.) Low (1°–2° high); *leaves oblong-lanceolate or elliptical, entire, downy both sides,* as well as the crowded branchlets; corolla shorter: otherwise as No. 8. — Swamps or moist woods, Maine to Wisconsin, and northward.

10. **V. vacillans,** Solander. (LOW BLUEBERRY.) *Low* (1°–2½° high), *glabrous; leaves obovate or oval, pale or dull, glaucous,* at least underneath, minutely ciliolate-serrulate or entire; corolla between bell-shaped and cylindraceous, the mouth somewhat contracted. — Dry woodlands, especially in sandy soil, common from Massachusetts and Vermont to Pennsylvania. — Branches yellowish-green. Berries ripening later than those of No. 8.

11. **V. corymbòsum,** L. (COMMON SWAMP-BLUEBERRY.) *Tall* (5°–10° high); *leaves ovate, oval, oblong, or elliptical-lanceolate;* corolla varying from turgid-ovate and cylindrical-urn-shaped to oblong-cylindrical. — Swamps and low thickets, everywhere common. — This yields the common *blueberry* or *blue huckleberry* at the latter part of the season. The typical form has the leaves entire and more or less pubescent, at least when young, as also the branchlets. The species exhibits the greatest variety of forms, — of which the last here men-

tioned is the most remarkable, and the only one which has any claims to be regarded as a species.

Var. **glàbrum.** Wholly or nearly glabrous throughout; leaves entire.

Var. **amœnum.** Leaves bristly-ciliate, shining above, green both sides, beneath somewhat pubescent on the veins. (V. amœnum, *Ait.*, &c.)

Var. **pállidum.** Leaves mostly glabrous, pale or whitish-glaucous, especially underneath, serrulate with bristly teeth. (V. pallidum, *Ait.*)

Var. **atrococcum.** Leaves entire, downy or woolly underneath even when old, as also the branchlets; berries smaller, black, without bloom. (V. fuscàtum, *Ait.? & Ed.* 1.)

3. CHIÓGENES, Salisb. CREEPING SNOWBERRY.

Calyx-tube adherent to the lower part of the ovary; the limb 4-parted. Corolla bell-shaped, deeply 4-cleft. Stamens 8, included, inserted on an 8-toothed epigynous disk: filaments very short and broad: anther-cells ovate-oblong, quite separate, not awned on the back, but each minutely 2-pointed at the apex, and opening by a large chink down to the middle. Berry white, globular, crowned with the 4-toothed calyx, rather dry, 4-celled, many-seeded. — A trailing and creeping evergreen, with very slender and scarcely woody stems, and small Thyme-like ovate and pointed leaves on short petioles, with revolute margins, smooth above, the lower surface and the branches beset with rigid rusty bristles. Flowers very small, solitary in the axils, on short nodding peduncles, with 2 large bractlets under the calyx. (Name from *χιών*, *snow*, and *γένος*, *offspring*, in allusion to the snow-white berries.)

1. **C. hispidula,** Torr. & Gr. (Vaccinium hispidulum, *L.* Gaultheria serpyllifòlia, *Pursh.* G. hispidula, *Muhl.*) Peat-bogs and mossy mountain woods, in the shade of evergreens; common northward, extending southward in the Alleghanies. May. — Plant with the aromatic flavor of the Boxberry, Wintergreen, or Birch. Leaves ⅓' long. Berries ¼' broad, bright white.

SUBORDER II. ERICÍNEÆ. THE PROPER HEATH FAMILY.

4. ARCTOSTÁPHYLOS, Adans. BEARBERRY.

Corolla ovate and urn-shaped, with a short revolute 5-toothed limb. Stamens 10, included: anthers with 2 reflexed awns on the back near the apex, opening by terminal pores. Drupe berry-like, with 5 seed-like nutlets. — Shrubs with alternate leaves, and scaly-bracted nearly white flowers in terminal racemes or clusters. Fruit austere. (Name composed of *ἄρκτος*, *a bear*, and *σταφυλή*, *a grape* or *berry*, the Greek of the popular name.)

1. **A. Uva-úrsi,** Spreng. (BEARBERRY.) Trailing; *leaves thick and evergreen*, obovate or spatulate, *entire, smooth; fruit red.* (Árbutus Uva-ursi, *L.*) — Rocks and bare hills; New Jersey to Wisconsin, and northward. May. (Eu.)

2. **A. alpìna,** Spreng. (ALPINE BEARBERRY.) Dwarf, tufted and depressed; *leaves deciduous, serrate, wrinkled* with strong netted veins, obovate; *fruit black.* — Alpine region of the White Mountains, New Hampshire, Mount Katahdin, Maine, and high northward. (Eu.)

5. EPIGÆA, L. GROUND LAUREL. TRAILING ARBUTUS.

Corolla salver-form; the tube hairy inside, as long as the ovate-lanceolate pointed and scale-like nearly distinct sepals. Stamens 10, with slender filaments: anthers oblong, awnless, opening lengthwise. Pod depressed-globular, 5-lobed, 5-celled, many-seeded. — A prostrate or trailing scarcely shrubby plant, bristly with rusty hairs, with evergreen and reticulated rounded and heart-shaped alternate leaves, on slender petioles, and with rose-colored flowers in small axillary clusters, from scaly bracts. (Name composed of ἐπί, *upon*, and γῆ, *the earth*, from the trailing growth.)

1. **E. rèpens,** L. — Sandy woods, or sometimes in rocky soil, especially in the shade of pines, common in many places. — Flowers appearing in early spring, and exhaling a rich spicy fragrance. In New England called MAYFLOWER.

6. GAULTHÈRIA, Kalm. AROMATIC WINTERGREEN.

Corolla cylindrical-ovoid or a little urn-shaped, 5-toothed. Stamens 10, included: anther-cells each 2-awned at the summit, opening by a terminal pore. Pod depressed, 5-lobed, 5-celled, 5-valved, many-seeded, enclosed when ripe by the calyx, which thickens and turns fleshy, so as to appear as a globular red berry! — Shrubs, or almost herbaceous plants, with alternate evergreen leaves and axillary (nearly white) flowers: pedicels with 2 bractlets. (Dedicated by Kalm to "*Dr. Gaulthier,*" of Quebec; *Linn. Amœn. Acad.* 3, p. 15; very likely the same person as the *M. Gautier* who contributed a paper on the Sugar-Maple to the Memoirs of the French Academy; but it is too late to alter the original orthography of the genus.)

1. **G. procúmbens,** L. (CREEPING WINTERGREEN.) Stems slender and extensively creeping on or below the surface; the flowering branches ascending, leafy at the summit (3′–5′ high); leaves obovate or oval, obscurely serrate; flowers few, mostly single in the axils, nodding. — Cool damp woods, mostly in the shade of evergreens: common northward, and southward along the Alleghanies. July. — The bright red berries (formed of the calyx) and the foliage have the well-known spicy-aromatic flavor of the Sweet Birch. In the interior of the country it is called *Wintergreen*, or sometimes *Tea-berry*. Eastward it is called *Checkerberry* or *Partridge-berry* (names also applied to Mitchella, the latter especially so), and *Boxberry*.

7. LEUCOTHÒË, Don. LEUCOTHOË.

Calyx of 5 nearly distinct sepals, imbricated in the bud, not enlarged nor fleshy in fruit. Corolla ovate or cylindraceous, 5-toothed. Stamens 10: anthers naked, or the cells with 1 or 2 erect awns at the apex, opening by a pore. Pod depressed, more or less 5-lobed, 5-celled, 5-valved, the sutures not thickened; valves entire: the many-seeded placentæ borne on the summit of the short columella, mostly pendulous. — Shrubs, with petioled and serrulate leaves, and white scaly-bracted flowers crowded in axillary or terminal spiked racemes. (A mythological name.)

§ 1. LEUCOTHOË PROPER. — *Anthers awnless; the cells sometimes obscurely 2-pointed: stigma depressed-capitate, 5-rayed: racemes sessile (dense), produced at the time of flowering from scaly buds in the axils of the coriaceous and shining persistent leaves of the preceding year, shorter than they: bracts persistent: bractlets at the base of the short pedicels.* (*Seed-coat loose and cellular, wing-like.*)

1. **L. axillàris,** Don. *Leaves lanceolate-oblong or oval, abruptly pointed* or acute, somewhat spinulose-serrulate, *on very short petioles; sepals broadly ovate.* (Andromeda axillaris, *Lam.*) — Banks of streams, Virginia, in the low country, and southward. Feb. - April. — Shrub 2° - 4° high.

2. **L. Catesbǣi.** *Leaves ovate-lanceolate, taper-pointed,* serrulate with ciliate-spinulose appressed teeth, *conspicuously petioled* (3′ - 6′ long); *sepals ovate-oblong,* often acute. (Andr. Catesbæi, *Walt.* A. axillaris, *Michx.* A. spinulosa, *Pursh.* L. spinulosa, *Don.*) — Moist banks of streams, Virginia along the mountains, and southward. May. — Shrub 2° - 4° high, with long spreading or recurved branches.

§ 2. EÙBOTRYS, Nutt. — *Anthers awned: stigma simple: bractlets close to the calyx, and, like the sepals, of a rigid texture, ovate or lanceolate, pointed: placentæ merely spreading: flowers very short-pedicelled, in long one-sided racemes, which mostly terminate the branches, formed with them in the summer, but the flower-buds not completing their growth and expanding till the following spring: bracts awl-shaped, deciduous: leaves membranaceous and deciduous, serrulate, the midrib and veins beneath pubescent.*

3. **L. recúrva.** *Branches and racemes recurved-spreading;* leaves lanceolate or ovate, taper-pointed; *sepals ovate; anther-cells* 1-*awned; pod* 5-*lobed; seeds flat and cellular-winged.* (Andr. recurva, *Buckley.*) — Dry hills, Alleghanies of Virginia and southward. April. — Lower and more straggling than the next.

4. **L. racemòsa.** *Branches and racemes mostly erect;* leaves oblong or oval-lanceolate, acute; *sepals ovate-lanceolate; anther-cells each 2-awned; pod not lobed; seeds angled and wingless.* (Andr. racemosa & A. paniculata, *L.*) — Moist thickets, Massachusetts to Virginia near the coast, and southward. May, June. — Shrub 4° - 6° high. Corolla cylindrical.

8. CASSÁNDRA, Don. LEATHER-LEAF.

Calyx of 5 distinct rigid ovate and acute sepals, imbricated in the bud, and with a pair of similar bractlets. Corolla cylindrical-oblong, 5-toothed. Stamens 10: anther-cells tapering into a tubular beak, and opening by a pore at the apex, awnless. Pod depressed, 5-celled, many-seeded; the pericarp of 2 layers, the outer 5-valved, and later the cartilaginous inner layer 10-valved. Seeds flattened, wingless. — Low and much-branched shrubs, with nearly evergreen and coriaceous leaves, which are scurfy, especially underneath. Flowers white, in the axils of the upper small leaves, forming small 1-sided leafy racemes; the flower-buds formed in the summer and expanding early the next spring. (*Cassandra,* a daughter of Priam and Hecuba.)

1. **C. calyculàta,** Don. Leaves oblong, obtuse, flat. (Andromeda calyculata, *L.*) — Bogs, common northward. (Eu.)

9. CASSIOPE, Don. CASSIOPE.

Calyx without bractlets, of 4 or 5 nearly distinct ovate sepals, imbricated in the bud. Corolla broadly campanulate, deeply 4-5-cleft. Stamens 8 or 10: anthers fixed by their apex; the ovoid cells each opening by a large terminal pore, and bearing a long recurved awn behind. Pod ovoid or globular, 4-5-celled, 4-5-valved; the valves 2-cleft: placentæ many-seeded, pendulous from the summit of the columella. Seeds smooth and wingless. — Small, arctic or alpine evergreen plants, resembling Club-Mosses or Heaths. Flowers solitary, nodding on slender erect peduncles, white or rose-color. (*Cassiope* was the mother of Andromeda.)

1. **C. hypnoides,** Don. Tufted and procumbent, moss-like (1′-4′ high); leaves needle-shaped, imbricated; corolla 5-cleft; style short and conical. (Andromeda hypnoides, *L.*) — Alpine summits of the Adirondack Mountains, New York (*Dr. Parry*), White Mountains, N. Hampshire, and Mount Katahdin, Maine (*Mr. Young*), and high northward. (Eu.)

10. ANDRÓMEDA, L. (in part.) (Andromeda, Zenobia, Lyonia, *Nutt.*, & Pieris, *Don.*)

Calyx without bractlets, of 5 nearly or partly distinct sepals, valvate in the early bud, but very early separate or open. Corolla 5-toothed. Stamens 10: anthers fixed near the middle, the cells opening by a terminal pore. Pod globular, 5-celled, 5-valved; the many-seeded placentæ borne on the summit or middle of the columella. — Shrubs, with umbelled, clustered, or panicled and racemed (mostly white) flowers. (Fancifully named by Linnæus for A. polifolia, in allusion to the fable of *Andromeda.*)

§ 1. ANDRÓMEDA PROPER. — *Corolla globular-urn-shaped: filaments bearded, not appendaged: anthers short, the cells each surmounted by a slender ascending awn: seeds turned in all directions, oval, with a close and hard smooth coat: flowers in a terminal umbel; pedicels from the axils of ovate persistent scaly bracts: leaves evergreen.*

1. **A. polifòlia,** L. Smooth and glaucous (6′-18′ high); leaves thick, lanceolate or oblong-linear, with strongly revolute margins, white beneath. — Cold bogs, from Pennsylvania northward. May. (Eu.)

§ 2. PORTÙNA, Nutt. — *Corolla ovoid-urn-shaped and 5-angled: filaments not appendaged: anthers oblong, the cells each bearing a long reflexed awn near the insertion: seeds mostly pendulous, and with a loose cellular coat: flowers in axillary and terminal racemes, which are formed in summer, but the blossoms expanding the following spring: pedicels 1-sided, bracted and with minute bractlets: leaves thick and evergreen.*

2. **A. floribùnda,** Pursh. Branches bristly when young; leaves lance-oblong, acute or pointed (2′ long), petioled, serrulate and bristly-ciliate; racemes dense, crowded in panicles. — Moist hills, in the Alleghanies from Virginia southward. April. — A very leafy shrub, 2°-10° high, bearing abundance of handsome flowers.

§ 3. PIÈRIS, Don. — *Corolla ovoid-oblong or cylindraceous: filaments slender and awl-shaped, appendaged with a spreading or recurved bristle on each side at or below the apex: anthers oblong, awnless: sutures of the 5-angular pod with a more or less thickened line or ridge, which often falls away separately when the pod opens: seeds turned in all directions, oblong, with a thin and rather loose reticulated coat: flowers in umbel-like clusters variously arranged.*

3. **A. Mariàna,** L. (Stagger-bush.) Nearly glabrous; leaves deciduous, but rather coriaceous, oval or oblong, veiny; flowers large and nodding, in clusters from axillary scaly buds, which are crowded on naked branches of the preceding year; sepals pretty large, leaf-like, deciduous with the leaves. — Sandy low places, Rhode Island to Virginia near the coast, and southward. May, June. — Shrub 2° - 4° high: foliage said to poison lambs and calves.

(A. nítida, Bartram, the Fetterbush, belongs to this group, and may grow in S. Virginia.)

§ 4. LYÒNIA, Nutt. — *Calyx 5-cleft: corolla globular, pubescent: filaments and anthers destitute of awns or appendages: pods prominently ribbed at the sutures, the ribs at length separating or separable: seeds slender, all pendulous, with a loose and thin cellular coat: flowers small, mostly in clusters which are racemose-panicled: bracts minute and deciduous: leaves pubescent or scurfy beneath.*

4. **A. ligustrìna,** Muhl. Leaves deciduous, not scurfy, smoothish when old, obovate-oblong varying to oblong-lanceolate; flowers racemose-panicled on branchlets of the preceding year. — Swamps and low thickets, N. England along the coast to Virginia, and southward. June, July. — Shrub 4° - 10° high.

11. OXYDÉNDRUM, DC. Sorrel-tree. Sour-wood.

Calyx without bractlets, of 5 almost distinct sepals, valvate in the bud. Corolla ovate, 5-toothed, puberulent. Stamens 10: anthers fixed near the base, linear, awnless, the cells tapering upwards, and opening by a long chink. Pod oblong-pyramidal, 5-celled, 5-valved; the many-seeded placentæ at the base of the cells. Seeds *all ascending,* slender, the thin and loose reticulated coat extended at both ends into awl-shaped appendages. — A tree with deciduous, oblong-lanceolate and pointed, soon smooth, serrulate leaves, on slender petioles, and white flowers in long one-sided racemes clustered in an open panicle, which terminates the branches of the season. Bracts and bractlets minute, deciduous. Foliage sour to the taste (whence the name, from *ὀξύς, sour,* and *δένδρον, tree*).

1. **O. arbòreum,** DC. (Andromeda arborea, *L.*) — Rich woods, from Penn. and Ohio southward, mostly along the Alleghanies. June, July. — Tree 40° - 60° high. Leaves in size and shape like those of the Peach.

12. CLÈTHRA, L. White Alder. Sweet Pepperbush.

Calyx of 5 sepals, imbricated in the bud. Corolla of 5 distinct obovate-oblong petals. Stamens 10, often exserted: anthers inversely arrow-shaped, inverted and reflexed in the bud, opening by terminal pores or short slits. Style slender, 3-cleft at the apex. Pod 3-valved, 3-celled, many-seeded, enclosed in the calyx. Shrubs, with alternate and serrate deciduous leaves, and white flowers in terminal hoary racemes. Bracts deciduous. (Κλήθρα, the ancient Greek name of the Alder, which this genus somewhat resembles in foliage.)

1. **C. alnifòlia,** L. *Leaves wedge-obovate, sharply serrate,* entire towards the base, prominently straight-veined, smooth, green both sides; *racemes upright,* panicled; *bracts shorter than the flowers;* filaments smooth. — Wet copses, Maine to Virginia near the coast, and southward. — Shrub 3° - 10° high, covered in July and August with handsome fragrant blossoms. — In the South are varieties with the leaves rather scabrous, and pubescent or white-downy beneath.

2. **C. acuminàta,** Michx. *Leaves oval or oblong, pointed,* thin, finely serrate (5′ - 7′ long), pale beneath; *racemes solitary, drooping; bracts longer than the flowers;* filaments and pods hairy. — Woods in the Alleghanies, Virginia and southward. July. — A tall shrub or small tree.

13. PHYLLÓDOCE, Salisb. PHYLLODOCE.

Corolla urn-shaped or bell-shaped, 5-toothed. Stamens 10: anthers pointless, shorter than the filaments, opening by terminal pores. Pod 5-celled, septicidally 5-valved (as are all the succeeding), many-seeded. — Low alpine Heath-like evergreens, clothed with scattered linear and obtuse rough-margined leaves. Flowers usually nodding on solitary or umbelled peduncles at the summit of the branches. ("A mythological name.")

1. **P. taxifòlia,** Salisb. Corolla oblong-urn-shaped, purplish, smooth; style included. (Menziesia cærùlea, *Smith.*) — Alpine summits of the White Mountains, New Hampshire, and Mount Katahdin, Maine (*Young*). July Shrub 4′ - 6′ high, tufted. (Eu.)

14. KÁLMIA, L. AMERICAN LAUREL.

Calyx 5-parted. Corolla between wheel-shaped and bell-shaped, 5-lobed, furnished with 10 depressions in which the 10 anthers are severally lodged until they begin to shed their pollen: filaments thread-form. Pod globose, 5-celled, many-seeded. — Evergreen mostly smooth shrubs, with alternate or opposite entire coriaceous leaves, and showy flowers. Pedicels bracted. Flower-buds naked. (Dedicated to *Peter Kalm,* a pupil of Linnæus who travelled in this country about the middle of the last century, afterwards Professor at Abo.)

§ 1. *Flowers in simple or clustered umbel-like corymbs: calyx smaller than the pod, persistent: leaves glabrous.*

1. **K. latifòlia,** L. (CALICO-BUSH. MOUNTAIN LAUREL. SPOONWOOD.) *Leaves mostly alternate, bright green both sides, ovate-lanceolate* or elliptical, tapering to each end, petioled; *corymbs terminal,* many-flowered, clammy-pubescent; pod depressed, glandular. — Rocky hills and damp soil, rather common from Maine to Ohio and Kentucky, as a shrub 4° - 8° high; but in the mountains from Penn. southward forming dense thickets, and often tree-like (10° - 20° high). May, June. — Flowers profuse, and very showy, light or deep rose-color, clammy.

2. **K. angustifòlia,** L. (SHEEP LAUREL. LAMBKILL.) *Leaves commonly opposite or in threes, pale or whitish underneath, light green above, narrowly*

oblong, obtuse, petioled; *corymbs lateral* (appearing later than the branches of the season), slightly glandular, many-flowered; pod depressed, nearly smooth. — Hill-sides, common. May - July. — Shrub 2° - 3° high, upright: the flowers more crimson, and two thirds smaller than in the last.

3. **K. glaùca,** Ait. (PALE LAUREL.) *Branchlets 2-edged; leaves opposite, nearly sessile, oblong, white-glaucous underneath, with revolute margins;* corymbs terminal, few-flowered, smooth; bracts large; pod ovoid, smooth. — Var. ROSMARINIFÒLIA has linear and strongly revolute leaves. — Cold peat-bogs and mountains, from Pennsylvania northward. July. — Straggling, about 1° high. Flowers ½′ broad, lilac-purple.

§ 2. *Flowers scattered, solitary in the axils of the leaves of the season: calyx leafy, larger than the pod, nearly equalling the corolla, at length deciduous: leaves (alternate and opposite) and branches bristly-hairy.*

4. **K. hirsùta,** Walt. Branches terete; leaves oblong or lanceolate (4″ long), becoming glabrous. — Sandy pine-barren swamps, E. Virginia and southward. May - Sept. — Shrub 1° high. Corolla rose-color.

15. MENZIÉSIA, Smith. MENZIESIA.

Calyx very small and flattish, 4-toothed or 4-lobed. Corolla cylindraceous-urn-shaped and soon bell-shaped, obtusely 4-lobed. Stamens 8, included: anther-cells opening at the top by an oblique pore. Pod ovoid, woody, 4-celled, 4-valved, many-seeded. Seeds narrow, with a loose coat. — A low shrub, with the straggling branches and the oblong-obovate alternate deciduous leaves (like those of Azalea) hairy and ciliate, with rusty rather chaff-like bristles. Flowers small, developed with the leaves, in terminal clusters from scaly buds, greenish-white and purplish, nodding. (Named for *A. Menzies,* who in Vancouver's voyage brought the species from the Northwest Coast.)

1. **M. ferrugìnea,** Smith: var. **globulàris.** Corolla rather shorter and broader perhaps than in the Oregon plant. — Alleghany Mountains, S. Pennsylvania to Virginia, &c. June. — Leaves tipped with a gland.

16. AZÀLEA, L. FALSE HONEYSUCKLE. AZALEA.

Calyx 5-parted, often minute. Corolla funnel-form, 5-lobed, slightly irregular; the lobes spreading. Stamens 5, with long exserted filaments, usually declined, as well as the similar style: anthers short, opening by terminal pores, pointless. Pod 5-celled, 5-valved, many-seeded. Seeds scale-like. — Upright shrubs, with alternate and obovate or oblong deciduous leaves, which are entire, ciliate, and mucronate with a glandular point. Flowers large and showy, often glandular and glutinous outside, in umbelled clusters from large scaly-imbricated terminal buds. (Name from ἀζαλέος, *arid,* — most inappropriate as applied to our species, which grow in swamps.)

* *Flowers appearing after the leaves.*

1. **A. arboréscens,** Pursh. (SMOOTH AZALEA.) *Branchlets smooth; leaves* obovate, obtuse, *very smooth both sides, shining above,* glaucous beneath, the *margins* bristly-ciliate; *calyx-lobes long and conspicuous;* corolla slightly clammy;

stamens and style very much exserted. — Mountains of Penn. to Virginia, and southward. June. — Shrub 3° - 10° high, with thickish leaves, and very fragrant rose-colored blossoms larger than in No. 3.

2. **A. viscòsa,** L. (CLAMMY AZALEA. WHITE SWAMP-HONEYSUCKLE.) *Branchlets bristly,* as well as the margins and midrib of the oblong-obovate otherwise smooth leaves; *calyx-lobes minute; corolla clammy, the tube much longer than the lobes;* stamens moderately, the style conspicuously, exserted. — Var. GLAÙCA has the leaves paler and often white-glaucous underneath or both sides, sometimes rough-hairy. Var. NÍTIDA is dwarf, with oblanceolate leaves green both sides. — Swamps, Maine to E. Kentucky, mostly near the coast. June, July. — Shrub 4° - 10° high, very variable, with clammy fragrant flowers, white or tinged with rose-color.

* * *Flowers appearing before or with the leaves.*

3. **A. nudiflòra,** L. (PURPLE AZALEA. PINXTER-FLOWER.) Branchlets rather hairy; leaves obovate or oblong, downy underneath; *calyx very short; tube of the corolla scarcely longer than the ample lobes, slightly glandular;* stamens and style much exserted. — Swamps, Massachusetts and New York to Virginia, and southward. April, May. — Shrub 2° - 6° high, with very showy flowers varying from flesh-color to pink and purple. There are numberless varieties, some of them exhibiting 10 or more stamens.

4. **A. calendulàcea,** Michx. (FLAME-COLORED AZALEA.) Branchlets and obovate or oblong leaves hairy; *calyx-lobes oblong, rather conspicuous; tube of the corolla shorter than the lobes, hairy;* stamens and style much exserted. —Woods, mountains of Penn. to Virginia, Kentucky, and southward. May. — Shrub 3° - 10° high, covered just when the leaves appear with a profusion of large orange blossoms, usually turning to flame-color, not fragrant.

17. RHODODÉNDRON, L. ROSE-BAY.

Calyx 5-parted, minute in our species. Corolla bell-shaped or partly funnelform, sometimes slightly irregular, 5-lobed. Stamens 10 (rarely fewer), commonly declined: anthers, pods, &c. as in Azalea. — Shrubs or low trees, with evergreen entire alternate leaves, and large showy flowers in compact terminal corymbs or clusters from large scaly-bracted buds. ('Ροδόδενδρον, *rose-tree; the* ancient name.)

1. **R. máximum,** L. (GREAT LAUREL.) *Leaves elliptical-oblong* or lance-oblong, *acute, narrowed towards the base, very smooth,* with somewhat revolute margins; corolla bell-shaped. — Damp deep woods, sparingly in New England, New York, and Ohio, but very common along shaded water-courses in the mountains of Penn. and southward. July. — Shrub or tree 6° - 20° high. Leaves 4′ - 10′ long, very thick. Corolla 1′ broad, pale rose-color or nearly white, greenish in the throat on the upper side, and spotted with yellow or reddish.

2. **R. Catawbiénse,** Michx. *Leaves oval or oblong, rounded at both ends, smooth,* pale beneath (3′ - 5′ long); corolla broadly bell-shaped, lilac-purple; pedicels rusty-downy. — High summits of the Alleghanies, Virginia and southward. June. — Shrub 3° - 6° high.

3. **R. Lappónicum,** Wahl. (LAPLAND ROSE-BAY.) *Dwarf,* pros-

trate; *leaves elliptical, obtuse, dotted* both sides (like the branches) with rusty scales; umbels few-flowered; corolla open bell-shaped, dotted; *stamens* 5–10. — Alpine summits of the high mountains of Maine, New Hampshire, and New York. July. — Shrub 6′ high, forming broad matted tufts; the leaves ½′ long. Corolla violet-purple. (Eu.)

18. RHODÒRA, Duham. RHODORA.

Calyx minute, 5-toothed. Corolla irregular and 2-lipped; the upper lip usually 3-lobed or 3-cleft, and the lower 2-parted or of 2 distinct spreading petals. Stamens 10, and with the slender style declined. Otherwise as in Azalea. (Name from ῥόδον, *a rose*, from the color of the showy flowers.)

1. **R. Canadénsis,** L. — Damp cold woods and swamps, New England to Penn. and northward, or on mountains. May. — A handsome low shrub, with the oblong deciduous leaves whitish and downy underneath; the showy rose-purple (rarely white) flowers in clusters on short peduncles, rather earlier than the leaves.

19. LÈDUM, L. LABRADOR TEA.

Calyx 5-toothed, very small. Corolla of 5 obovate and spreading distinct petals. Stamens 5–10: anthers opening by terminal pores. Pod 5-celled, splitting from the base upwards, many-seeded: placentæ borne on the summit of the columella. — Low evergreen shrubs, with the alternate entire leaves clothed with rusty wool underneath, the margins revolute: slightly fragrant when bruised. Flowers white, handsome, in terminal umbel-like clusters from large scaly buds, bracts caducous. (Λῆδον, the ancient Greek name of the Cistus, transferred by Linnæus to this genus.)

1. **L. latifòlium,** Ait. Leaves elliptical or oblong; stamens 5, sometimes 6 or 7; pod oblong. — Cold bogs and damp mountain woods, New England to Pennsylvania, Wisconsin, and northward. June. — Shrub 2°–5° high. — (L. PALÚSTRE, *L.*, grows in British America, but is not known to occur in the United States. It is distinguished by its linear leaves, uniformly 10 stamens, and *oval pods*.) (Eu.)

20. LOISELEÙRIA, Desv. ALPINE AZALEA.

Calyx 5-parted, nearly as long as the rather bell-shaped and deeply 5-cleft regular corolla. Stamens 5, not declined, included: anthers opening lengthwise. Style short. Pod ovoid, 2–3-celled, many-seeded, 2–3-valved; the valves 2-cleft from the apex: placentæ borne on the middle of the columella. — A dwarf and prostrate evergreen shrubby plant, much branched and tufted, smooth, with small and coriaceous opposite elliptical leaves, on short petioles, with revolute margins. Flowers small, white or rose-color, 2–5 in a cluster, from a terminal scaly bud; the scales or bracts thick and persistent. Named for *Loiseleur Delongchamps*, a French botanist.)

1. **L. procúmbens,** Desv. (Azalea procumbens, *L.*) — Alpine summits of the White Mountains, New Hampshire, on rocks. June. (Eu.)

21. LEIOPHÝLLUM, Pers. SAND MYRTLE.

Calyx 5-parted. Corolla of 5 distinct obovate-oblong petals, spreading. Stamens 10, exserted: anthers opening lengthwise. Pod 2–3-celled, splitting from the apex downward, many-seeded. — A low much-branched evergreen, with the aspect, foliage, &c. of the preceding genus, but the crowded leaves often alternate, scarcely petioled. Flowers small, white, in terminal umbel-like clusters. (Name from λεῖος, *smooth*, and φύλλον, *foliage*, in allusion to the smooth and shining leaves.)

1. **L. buxifòlium,** Ell. — Sandy pine barrens of New Jersey, and mountain-tops in Virginia? and southward. May. — Shrub 6′–10′ high, with the oval or oblong leaves ¼′–½′ long.

SUBORDER III. PYROLÈÆ. THE PYROLA FAMILY.

22. PÝROLA, L. FALSE WINTERGREEN.

Calyx 5-parted, persistent. Petals 5, concave and more or less converging, deciduous. Stamens 10: filaments awl-shaped, naked: anthers turned outwards and inverted in the bud, soon erect, opening by 2 pores at the scarcely (if at all) 2-horned apex, more or less 4-celled. Style long and generally turned to one side: stigmas 5, either projecting or confluent with the ring or collar which surrounds them. Pod depressed-globose, 5-lobed, 5-celled, 5-valved from the base upwards (loculicidal); the valves cobwebby on the edges. Seeds minute, innumerable, resembling saw-dust, with a very loose cellular-reticulated coat. — Low and smooth perennial herbs, with running subterranean shoots, bearing a cluster of rounded and petioled evergreen root-leaves, and a simple raceme of nodding flowers, on an upright scaly-bracted scape. (Name a diminutive of *Pyrus*, the Pear-tree, from some fancied resemblance in the foliage, which is not obvious.)

* *Stamens ascending: style declining and curved, at length longer than the petals: stigmas narrow, soon exserted beyond the ring: leaves denticulate or entire.*

1. **P. rotundifòlia,** L. (ROUND-LEAVED PYROLA.) *Leaves orbicular, thick, shining,* usually shorter than the petiole; raceme elongated, many-flowered; *calyx-lobes lanceolate or oblong-lanceolate,* acutish, with somewhat spreading tips, *one half or one third the length of the* roundish-obovate nearly spreading (chiefly white) *petals; anther-cells scarcely pointed at the apex.* — Damp or sandy woods; common, especially northward. June, July. — Scape 6′–12′ high, many-bracted: flowers ¾′ broad. — Exhibits many varieties, such as Var. INCARNÀTA, with flesh-colored flowers; calyx-lobes triangular-lanceolate. — Var. ASARIFÒLIA, with oblate or round-reniform leaves, and triangular-ovate calyx-lobes of about ⅓ the length of the white or flesh-colored petals. (P. asarifòlia, *Michx.*) Common northward. — Var. ULIGINÒSA, with roundish-oval or somewhat kidney-shaped smaller leaves (1′–1½′ wide), and ovate acute calyx-lobes ¼ the length of the reddish or purple petals; flowers rather smaller, few or several. (P. uliginosa, *Torr. & Gr.*) Cold bogs, N. New England to Wisconsin, and northward. (Eu.)

2. **P. elliptica,** Nutt. (SHIN-LEAF.) *Leaves thin and dull, elliptical or obovate-oval, usually longer than the margined petiole;* raceme many-flowered; *calyx-lobes ovate, acute, not one fourth the length of the* obovate rather spreading (greenish-white) *petals;* anther-cells scarcely pointed at the apex. — Rich woods, New England to Pennsylvania, Wisconsin, and northward; common. June. — Scape and flowers nearly as large as in No. 1.

3. **P. chlorántha,** Swartz. (SMALL PYROLA.) *Leaves small* (1′ long), *roundish, thick, dull, shorter than the petiole; scape few-flowered,* naked (5′–8′ high), *calyx-lobes roundish-ovate, very short;* the elliptical petals converging (greenish-white); *anther-cells pointed;* style strongly deflexed, scarcely exserted. (P. asarifolia, *Bigel., &c.*) — Open woods, New England to Pennsylvania, and northward. June. (Eu.)

* * *Stamens and style straight: stigmas thick, united with the expanded ring: i. e. stigma peltate, 5-rayed.*

4. **P. secúnda,** L. (ONE-SIDED PYROLA.) *Leaves ovate, thin,* longer than the petiole, scattered, *finely serrate;* racemes dense and spike-like, with the numerous small (greenish-white) *flowers all turned to one side;* calyx-lobes ovate, very much shorter than the oblong and erect petals; *style long and exserted.* — Rich woods; common eastward and northward. July, Aug. — Scape 3′–6′ high. (Eu.)

5. **P. minor,** L. (LESSER PYROLA.) *Leaves roundish,* slightly crenulate, thickish, mostly longer than the margined petiole; *raceme spiked;* calyx-lobes triangular-ovate, very much shorter than the nearly *globose corolla; style short and included.* — Woods, at the base of the White Mountains, New Hampshire. July, Aug. — Scape 5′–10′ high. Flowers small, crowded, white or rose-color. (Eu.)

23. MONÈSES, Salisb. ONE-FLOWERED PYROLA.

Petals 5, widely spreading, orbicular. Stamens 10: filaments awl-shaped, naked: anthers as in Pyrola, but conspicuously 2-horned at the apex, 2-celled. Style straight, exserted: the 5 stigmas long and radiating. Valves of the pod naked. Otherwise as in Pyrola. — A small perennial, with the rounded and veiny serrate thin leaves clustered at the ascending apex of creeping subterranean shoots; the 1–2-bracted scape bearing a single terminal flower. Parts of the flower sometimes in fours. (Name μόνος, *single*, and ἥσις, *desire*, probably in allusion to the handsome solitary flower.)

1. **M. uniflòra.** (Pýrola uniflora, *L.*) — Deep cold woods, Pennsylvania to Maine, Lake Superior, and northward. June. — Plant 2′–4′ high, smooth; the corolla ½′ broad, white or slightly rose-color. (Eu.)

24. CHIMÁPHILA, Pursh. PIPSISSEWA.

Petals 5, concave, orbicular, widely spreading. Stamens 10: filaments enlarged and hairy in the middle: anthers as in Pyrola, but nearly 2-celled, somewhat 2-horned at the apex. Style very short, inversely conical, nearly immersed in the depressed summit of the globular ovary: stigma broad and orbicular, disk-shaped, the border 5-crenate. Pod, &c. as in Pyrola, but splitting from the apex downwards, the edges of the valves not woolly. — Low, nearly herbaceous plants, with long running underground shoots, and evergreen thick and shining leaves somewhat whorled or scattered along the short ascending stems: the fragrant (white or purplish) flowers corymbed or umbelled on a terminal peduncle. (Name from χεῖμα, *winter*, and φιλέω, *to love*, in allusion to one of the popular names, viz. *Wintergreen.*)

1. **C. umbellàta,** Nutt. (Prince's Pine. Pipsissewa.) *Leaves wedge-lanceolate, acute at the base,* sharply serrate, *not spotted;* peduncles 4-7-flowered. — Dry woods; common. June. — Plant 4′-10′ high, leafy: petals flesh-color: anthers violet. (Eu.)

2. **C. maculàta,** Pursh. (Spotted Wintergreen.) *Leaves ovate-lanceolate, obtuse at the base,* remotely toothed, *the upper surface variegated with white;* peduncles 1-5-flowered. — Dry woods, most common in the Middle States. June, July. — Plant 3′-6′ high.

Suborder IV. MONOTRÒPEÆ. The Indian-Pipe Family.

25. PTERÓSPORA, Nutt. Pine-drops.

Calyx 5-parted. Corolla ovate, urn-shaped, 5-toothed, persistent. Stamens 10: anthers 2-celled, awned on the back, opening lengthwise. Style short: stigma 5-lobed. Pod globose, depressed, 5-lobed, 5-celled, loculicidal, but the valves cohering with the columella. Seeds very numerous, ovoid, tapering to each end, the apex expanded into a broad reticulated wing many times larger than the body of the seed. — A stout and simple purplish-brown clammy-pubescent herb (1°-2° high); the wand-like stem furnished towards the base with scattered lanceolate scales in place of leaves, above bearing many nodding (white) flowers, like those of Andromeda, in a long bracted raceme. (Name from πτερόν, *a wing,* and σπορά, *seed,* alluding to the singular wing borne by the seeds.)

1. **P. Andromedèa,** Nutt. — Hard clay soil, parasitic on the roots apparently of pines, from Vermont, Peekskill and Albany, N. Y., and N. Pennsylvania northward and westward: rare.

26. SCHWEINÍTZIA, Ell. Sweet Pine-sap.

Calyx of 5 oblong-lanceolate acute scale-like sepals, erect, persistent. Corolla persistent, bell-shaped, rather fleshy, 5-lobed, slightly 5-gibbous at the base. Stamens 10: anthers much shorter than the filaments, fixed near the summit, awnless; the 2 sac-shaped cells opening at the top. Pod ovoid, 5-celled, with a short and thick style, and a large 5-angular stigma. Seeds innumerable. — A low and smooth brownish plant, 3′-4′ high, with the aspect of Monotropa, scaly-bracted, the flowers several in a terminal spike, at first nodding, flesh-color, exhaling the fragrance of violets. (Named for the late *L. D. von Schweinitz.*)

1. **S. odoràta,** Ell. — Woods, parasitic on the roots of herbs, Maryland and southward: rare. April.

27. MONÓTROPA, L. INDIAN PIPE. PINE-SAP.

Calyx of 2 – 5 lanceolate bract-like scales, deciduous. Corolla of 4 or 5 separate erect spatulate or wedge-shaped scale-like petals, which are gibbous or saccate at the base, and tardily deciduous. Stamens 8 or 10: filaments awl-shaped: anthers kidney-shaped, becoming 1-celled, opening across the top. Style columnar: stigma disk-like, 4 – 5-rayed. Pod ovoid, 8 – 10-grooved, 4 – 5-celled, loculicidal: the very thick placentæ covered with innumerable minute seeds, which have a very loose coat. — Low and fleshy herbs, tawny, reddish, or white, parasitic on roots, or growing on decomposing vegetable matter like a Fungus; the clustered stems springing from a ball of matted fibrous rootlets, furnished with scales or bracts in place of leaves, 1 – several-flowered; the flowering summit at first nodding, in fruit erect. (Name composed of *μόνος*, *one*, and *τρόπος*, *turn*, from the summit of the stem turned to one side.)

§ 1. MONOTROPA, Nutt. — *Plant inodorous, with a single* 5-*petalled and* 10-*androus flower at the summit; the calyx of* 2 – 4 *irregular scales or bracts: anthers transverse, opening by* 2 *chinks; style short and thick.*

1. **M. uniflòra,** L. (INDIAN PIPE. CORPSE-PLANT.) Smooth, waxy-white (turning blackish in drying, 3′ – 8′ high); stigma naked. — Dark and rich woods: common. June – Aug. (Also in the Himalayas!)

§ 2. HYPÓPITYS, Dill. — *Plant commonly fragrant: flowers several in a scaly raceme; the terminal one usually* 5-*petalled and* 10-*androus, while the rest are* 4-*petalled and* 8-*androus; the bract-like sepals mostly as many as the petals: anthers opening by a continuous line into* 2 *very unequal valves, the smaller one erect and appearing like a continuation of the filament: style longer than the ovary, hollow.*

2. **M. Hypópitys,** L. (PINE-SAP. FALSE BEECH-DROPS.) Somewhat pubescent or downy, tawny, whitish, or reddish (4′ – 12′ high); pod globular-ovoid or oval; stigma ciliate underneath. — The more pubescent form is M lanuginòsa, *Michx.* — Oak and pine woods; common. July, Aug. (Eu.)

ORDER 63. GALACÍNEÆ. (GALAX FAMILY.)

Character that of the following genus; the true relationship of which is still unknown.

1. GÀLAX, L. GALAX.

Calyx of 5 small and separate sepals, persistent. Petals 5, hypogynous, obovate-spatulate, rather erect, deciduous. Stamens hypogynous: filaments united in a 10-toothed tube, slightly cohering with the base of the petals, the 5 teeth opposite the petals naked, the 5 alternate ones shorter and bearing each a roundish 1-celled anther, which opens across the top. Pollen simple. Style short: stigma 3-lobed. Pod ovoid, 3-celled, loculicidally 3-valved: columella none. Seeds numerous, the cellular loose coat tapering to each end. Embryo straight in fleshy albumen, more than half its length. — A smooth herb, with a thick matted tuft of scaly creeping rootstocks, beset with fibrous red roots, sending up round-heart-shaped crenate-toothed and veiny shining leaves (about 2′ wide) on slender petioles, and a slender naked scape, 1° – 2° high, bearing a wand-like spike or raceme of small and minutely-bracted white flowers. (Name from γάλα, *milk*, — of no application to this plant.)

1. **G. aphýlla,** L. — Open woods, Virginia and southward. June.

ORDER 64. AQUIFOLIÀCEÆ. (HOLLY FAMILY.)

Trees or shrubs, with small axillary 4 – 6-merous flowers, a minute calyx free from the 4 – 6-celled ovary and the 4 – 6-seeded berry-like drupe, the stamens as many as the divisions of the almost or quite 4 – 6-petalled corolla and alternate with them, attached to their very base. — Corolla imbricated in the bud. Anthers opening lengthwise. Stigmas 4 – 6, or united into one, nearly sessile. Seeds suspended and solitary in each cell, anatropous, with a minute embryo in fleshy albumen. Leaves simple, mostly alternate. Flowers white or greenish. — A small family, here represented by only two genera, since we include Prinos under Ilex.

1. ÌLEX, L. (Ilex & Prinos, *L.*) HOLLY.

Flowers more or less diœciously polygamous, but many of them perfect. Calyx 4 – 6-toothed. Petals 4 – 6, separate, or united only at the base, oval or obovate, obtuse, spreading. Stamens 4 – 6. The berry-like drupe containing 4 – 8 little nutlets. — Leaves alternate. Fertile flowers inclined to be solitary, and the partly sterile flowers to be clustered in the axils. (The ancient Latin name of the Holly-Oak rather than of the Holly.)

§ 1. AQUIFÒLIUM, Tourn. — *Parts of the flowers commonly in fours, sometimes in fives or sixes, most of them perfect: drupe red, its nutlets ribbed, veiny, or one-grooved on the back: leaves (mostly smooth) coriaceous and evergreen.*

* *Leaves armed with spiny teeth: trees.*

1. **I. opàca,** Ait. (AMERICAN HOLLY.) Leaves oval, flat, the wavy margins with scattered spiny teeth; flowers in loose clusters along the base of the young branches and in the axils; calyx-teeth acute. — Moist woodlands, Maine to Penn. near the coast, and more common from Virginia southward. June. — Tree 20° – 40° high; the deep green foliage less glossy, the berries not so bright red, and their nutlets not so veiny, as in the European Holly.

* * *Leaves serrate or entire, not spiny: shrubs.*

2. **I. Cassìne,** L. (CASSENA. YAUPON.) *Leaves lance-ovate or elliptical, crenate* (1′ – 1½′ long); flower-clusters nearly sessile, smooth; *calyx-teeth obtuse.* — Virginia and southward along the coast. May. — Leaves used for tea, as they were to make the celebrated *black drink* of the North Carolina Indians.

3. **I. myrtifòlia,** Walt. *Leaves linear-lanceolate or linear-oblong,* sparingly and *sharply serrate or entire* (1′ long); peduncles slender and 3 – 9-flowered, or the more fertile shorter and 1-flowered, smooth; *calyx-teeth acute.* — Coast of Virginia and southward. May.

4. **I. Dahoòn,** Walt. (DAHOON HOLLY.) *Leaves oblanceolate or oblong, entire, or sharply serrate* towards the apex, with revolute margins (2′-3′ long), *the midrib and peduncles pubescent; calyx-teeth acute.* — Swamps, coast of Virginia and southward. June.

§ 2. PRINOÌDES. — *Parts of the (polygamous) flowers in fours or fives (rarely in sixes): drupe red or purple, the nutlets striate-ribbed (the dorsal ribs nearly simple): leaves membranaceous and deciduous: shrubs.*

5. **I. decídua,** Walt. *Leaves wedge-oblong or lance-obovate, obtusely serrate, downy on the midrib* beneath; peduncles of the sterile flowers longer than the petioles, of the fertile short; calyx-teeth smooth, acute. — Wet grounds, Virginia, Illinois, and southward. May.

6. **I. montícola.** *Leaves ovate or lance-oblong, ample* (3′-5′ long), *smooth, sharply serrate;* fertile flowers very short-peduncled; calyx ciliate. (I. ambígua, *Torr.* I. montàna, *ed.* 1, not Prinos montanus, *Sw.*) — Damp woods, Taconic and Catskill Mountains, New York, and Alleghanies from Penn. southward.

§ 3. PRÌNOS, L. — *Parts of the sterile flowers in fours, fives, or sixes, those of the fertile flowers commonly in sixes (rarely in fives, sevens, or eights): nutlets smooth and even: shrubs.*

* *Leaves deciduous: flowers in sessile clusters or solitary: fruit scarlet.*

7. **I. verticillàta.** (BLACK ALDER. WINTERBERRY.) *Leaves* obovate, oval, or wedge-lanceolate, pointed, acute at the base, serrate, *downy on the veins beneath; flowers all very short-peduncled.* (Prinos verticillatus, *L.*) — Low grounds; common, especially northward. May, June.

8. **I. lævigàta.** (SMOOTH WINTERBERRY.) Leaves lanceolate or oblong-lanceolate, pointed at both ends, appressed-serrulate, shining above, beneath mostly *glabrous; sterile flowers long-peduncled.* (Prinos lævigatus, *Pursh.*) — Wet grounds, Maine to the mountains of Virginia. June. — Fruit larger than in No. 7, ripening earlier in the autumn.

* * *Leaves coriaceous and evergreen, shining above, often black-dotted beneath: fruit black.* (Winterlia, *Mœnch.*)

9. **I. glàbra.** (INKBERRY.) Leaves wedge-lanceolate or oblong, sparingly toothed towards the apex, smooth; peduncles (½′ long) of the sterile flowers 3-6-flowered, of the fertile 1-flowered; calyx-teeth rather blunt. (Prinos glaber, *L.*) — Sandy grounds, Cape Ann, Massachusetts, to Virginia and southward near the coast. June. — Shrub 2°-3° high.

2. NEMOPÁNTHES, Raf. MOUNTAIN HOLLY.

Flowers polygamo-diœcious. Calyx in the sterile flowers of 4-5 minute deciduous teeth; in the fertile ones obsolete. Petals 4-5, oblong-linear, widely spreading, distinct. Stamens 4-5: filaments slender. Drupe with 4-5 bony nutlets, light red. — A much-branched shrub, with ash-gray bark, alternate and oblong deciduous leaves on slender petioles, entire, or slightly toothed, smooth. Flowers on long and slender axillary peduncles, solitary, or sparingly clustered. (Name said by the author of the genus to mean "flower with a filiform peduncle," therefore probably composed of *νῆμα*, *a thread*, *ποῦς*, *a foot*, and *ἄνθος*, *a flower.*)

1. **N. Canadénsis,** DC. (Ilex Canadensis, *Michx.*) — Damp cold woods, from the mountains of Virginia to Maine, Wisconsin, &c., chiefly northward. May.

ORDER 65. STYRACÀCEÆ. (STORAX FAMILY.)

Shrubs or trees, with alternate simple leaves destitute of stipules, and perfect regular flowers; the calyx either free or adherent to the 2 – 5*-celled ovary; the corolla of* 4 – 8 *petals, commonly more or less united at the base; the stamens twice as many as the petals or more numerous, monadelphous or polyadelphous at the base; style* 1; *fruit dry or drupe-like,* 1 – 5*-celled, the cells commonly* 1*-seeded.* — Seeds anatropous. Embryo nearly the length of the albumen: radicle slender, as long as or longer than the flat cotyledons. Corolla hypogynous when the calyx is free: the stamens adherent to its base. Ovules 2 or more in each cell. — A small family, mostly of warm countries, comprising two very distinct groups or tribes.

TRIBE I. **STYRACEÆ.** Calyx 4 - 8-toothed or entire. Stamens 2 - 4 times as many as the petals: anthers linear or oblong, adnate, introrse. Ovules or part of them ascending. — Flowers white, handsome. Pubescence soft and stellate.

1. STYRAX. Calyx coherent only with the base of the 3-celled ovary. Corolla mostly 5-parted. Fruit 1-celled, 1-seeded.
2. HALESIA. Calyx coherent with the whole surface of the 2 - 4-celled ovary, which is 2 - 4-winged and 2 - 4-celled in fruit. Corolla 4-lobed.

TRIBE II. **SYMPLOCINEÆ.** Calyx 5 cleft. Stamens usually very numerous: anthers short, innate. Ovules pendulous. — Flowers yellow. Pubescence simple.

3. SYMPLOCOS. Calyx coherent. Petals 5, united merely at the base.

1. STỲRAX, Tourn. STORAX.

Calyx truncate, somewhat 5-toothed, the base (in our species) coherent with the base of the 3-celled many-ovuled ovary. Corolla 5-parted (rarely 4 – 8-parted), large; the lobes mostly soft-downy, various in the bud. Stamens twice as many as the lobes of the corolla: filaments flat, united at the base into a short tube: anthers linear, adnate. Fruit globular, its base surrounded by the persistent calyx, 1-celled, mostly 1-seeded, dry, often 3-valved. Seed globular, erect, with a hard coat. — Shrubs or small trees, with commonly deciduous leaves, and axillary or leafy-racemed white and showy flowers on drooping peduncles. Pubescence scurfy or stellate. (*ἡ Στύραξ*, the ancient Greek name of the tree which produces *storax.*)

1. **S. grandifòlia,** Ait. Leaves obovate, acute or pointed, *white-tomentose beneath* (3′ – 6′ long); *flowers mostly in elongated racemes;* corolla (½′ long) convolute-imbricated in the bud. — Light soils, Virginia and southward. April.

2. **S. pulverulénta,** Michx. Leaves oval or obovate (abo[illegible] 1′ long), *above sparingly puberulent, and scurfy-tomentose beneath; flowers* (½′ long) 1 – 3 to-

gether in the axils and at the tips of the branches.—Low pine barrens, Virginia (*Pursh*) and southward.—Shrub 1°–4° high.

3. **S. Americàna,** Lam. Leaves oblong, acute at both ends (1′–3′ long), *smooth, or barely pulverulent beneath; flowers axillary or in 3–4-flowered racemes* (½′ long); corolla valvate in the bud. (S. glabrum and S. læve, *Ell.*)—Margin of swamps, Virginia and southward. May.—Shrub 4°–8° high.

2. HALÈSIA, Ellis. SNOWDROP OR SILVER-BELL-TREE.

Calyx inversely conical, 4-toothed; the tube 4-ribbed, coherent with the 2–4-celled ovary. Petals 4, united at the base, or oftener to the middle, into an open bell-shaped corolla, convolute or imbricated in the bud. Stamens 8–16: filaments united into a ring at the base, and usually a little coherent with the base of the corolla: anthers linear-oblong. Ovules 4 in each cell. Fruit large and dry, 2–4-winged, within bony and 1–4-celled. Seeds single in each cell, cylindrical.—Shrubs or small trees, with large and veiny pointed deciduous leaves, and showy white flowers, drooping on slender pedicels, in clusters or short racemes, from axillary buds of the preceding year. Pubescence partly stellate. (Named for *S. Hales*, author of Vegetable Statics, &c.)

1. **H. tetráptera,** L. Leaves oblong-ovate; fruit 4-winged.—Banks of streams, upper part of Virginia, also on the Ohio River at Evansville (*Short*), and southward. Fruit 1½′ long.

3. SÝMPLOCOS, Jacq. § HÒPEA, L. SWEET-LEAF.

Calyx 5-cleft, the tube coherent with the lower part of the 3-celled ovary. Petals 5, imbricated in the bud, lightly united at the base. Stamens very numerous, in 5 clusters, one cohering with the base of each petal: filaments slender: anthers very short. Fruit drupe-like or dry, mostly 1-celled and 1-seeded.—Shrubs or small trees; the leaves commonly turning yellowish in drying, and furnishing a yellow dye. Flowers in axillary clusters or racemes, yellow. (Name σύμπλοκος, *connected*, from the union of the stamens. Hopea was dedicated to *Dr. Hope*, of Edinburgh.)

1. **S. tinctòria,** L'Her. (HORSE-SUGAR, &c.) Leaves elongated-oblong, acute, obscurely toothed, thickish, almost persistent, minutely pubescent and pale beneath (3′–5′ long); flowers 6–14, in close and bracted clusters, odorous.—Rich ground, Virginia and southward. April.—Leaves sweet, greedily eaten by cattle.

ORDER 66. EBENÀCEÆ. (EBONY FAMILY.)

Trees or shrubs, with alternate entire leaves, and polygamous regular flowers which have a calyx free from the 3–12-celled ovary; the stamens 2–4 times as many as the lobes of the corolla, often in pairs before them, their anthers turned inwards, and the fruit a several-celled berry. Ovules 1 or 2, suspended from the summit of each cell. Seeds anatropous, mostly single in each cell, large and flat, with a smooth coriaceous integument; the embryo shorter than the hard albumen, with a long radicle and flat cotyledons. Styles wholly or partly separate. — Wood hard and dark-colored. No milky juice. — A small family, chiefly subtropical, represented here by

1. DIOSPÝROS, L. Date-Plum. Persimmon.

Calyx 4 - 6-lobed. Corolla 4 - 6-lobed, convolute in the bud. Stamens commonly 16 in the sterile flowers, and 8 in the fertile, in the latter imperfect. Berry large, globular, surrounded at the base by the thickish calyx, 4 - 8-celled, 4 - 8-seeded. — Flowers diœciously polygamous, the fertile axillary and solitary, the sterile smaller and often clustered. (Name, Διός, *of Jove*, and πυρός, *grain.*)

1. **D. Virginiàna,** L. (Common Persimmon.) Leaves ovate-oblong, smooth or nearly so; peduncles very short; calyx 4-parted; corolla between bell-shaped and urn-shaped; styles 4, two-lobed at the apex; ovary 8-celled. — Woods and old fields, Rhode Island and New York to Illinois, and southward. June. — A small tree with thickish leaves, a greenish-yellow leathery corolla, and a plum-like fruit, 1′ in diameter, which is exceedingly astringent when green, yellow when ripe, and sweet and edible after exposure to frost.

Order 67. SAPOTÀCEÆ. (Sappodilla Family.)

Trees or shrubs, mostly with a milky juice, simple and entire alternate leaves (often rusty-downy beneath), small and perfect regular flowers usually in axillary clusters; the calyx free and persistent; the fertile stamens commonly as many as the lobes of the hypogynous short corolla and opposite them, inserted on its tube, along with one or more rows of appendages and scales, or sterile stamens; anthers turned outwards; ovary 4 - 12*-celled, with a single anatropous ovule in each cell; seeds large.* — Albumen mostly none; but the large embryo with thickened cotyledons. Style single, pointed. — A small, mostly tropical order, producing the Sappodilla or Star-apple, and some other edible fruits, represented in our district only by the genus

1. BUMÈLIA, Swartz. Bumelia.

Calyx 5-parted. Corolla 5-cleft, with a pair of internal appendages at each sinus. Fertile stamens 5: anthers arrow-shaped. Sterile stamens 5, petal-like, alternate with the lobes of the corolla. Ovary 5-celled. Fruit small, resembling a cherry, black, containing a large ovoid and erect seed, with a roundish scar at its base. — Flowers small, white, in fascicles from the axil of the leaves. Branches often spiny. Leaves often fascicled on short spurs. Wood very hard. (The ancient name of a kind of Ash.)

1. **B. lycioìdes,** Gærtn. (Southern Buckthorn.) Spiny (10° - 25° high); *leaves wedge-oblong varying to oval-lanceolate,* with a tapering base, often acute, *reticulated, nearly glabrous* both sides (2′ - 4′ long); *clusters densely many-flowered;* fruit ovoid. — Moist ground, S. Kentucky and southward. May, June.

2. **B. lanuginòsa,** Pers. Spiny (10° - 40° high); *leaves oblong-obovate or wedge-obovate, rusty-woolly beneath,* obtuse (1½′ - 3′ long); *clusters* 6 - 12*-flowered;*

fruit globular. (B. lanuginosa & tomentosa, *A. DC.*) — Woods, Illinois, opposite St. Louis, and southward, — a variety with the leaves less woolly and rusty beneath (B. oblongifolia, *Nutt.*), passing towards No. 1. July.

ORDER 68. PLANTAGINÀCEÆ. (PLANTAIN FAMILY.)

Chiefly stemless herbs, with regular 4-merous spiked flowers, the stamens inserted on the tube of the dry and membranaceous veinless monopetalous corolla, alternate with its lobes; — chiefly represented by the genus

1. PLANTÀGO, L. PLANTAIN. RIBGRASS.

Calyx of 4 imbricated persistent sepals, with dry membranaceous margins. Corolla salver-form, withering on the pod, the border 4-parted. Stamens 4, or rarely 2, in all or some flowers with long and weak exserted filaments, and fugacious 2-celled anthers. Ovary 2- (or falsely 3 - 4-) celled, with 1 - several ovules in each cell. Pod 2-celled, 2 - several-seeded, opening all round by a transverse line, so that the top falls off like a lid, and the loose partition (which bears the peltate seeds) falls away. Embryo straight, in fleshy albumen. — Leaves ribbed. Flowers whitish, small, in a bracted spike or head, raised on a naked scape. (The Latin name of the Plantain.)

§ 1. *Flowers all perfect and alike: corolla glabrous, the lobes reflexed or spreading: stamens 4, with long capillary filaments: pod 2-celled, 2 - 18-seeded: seeds not hollowed out on the inner face: perennials, with several-ribbed (broad) leaves.*

1. **P.** MÀJOR, L. (COMMON PLANTAIN.) Smooth or hairy; leaves ovate, oval, or slightly heart-shaped, often toothed, abruptly narrowed into a channelled petiole; spike cylindrical; *pod 7 - 16-seeded.* — Moist grounds, especially near dwellings. June - Sept. Very much varying in size. (Nat. from Eu.)

2. **P. cordàta,** Lam. Very glabrous; *leaves heart-shaped or round-ovate* (3′ - 8′ long), long-petioled, the *ribs rising from the midrib;* spike at length loosely flowered; *bracts round-ovate, fleshy; pod 2 - 4-seeded.* — Along rivulets, New York to Wisconsin (rare), and southward. April - June.

§ 2. *Flowers all perfect and alike: corolla pubescent below: stamens 4, with long filaments: pods 2-celled and 2-seeded, or incompletely 3 - 4-celled and 3 - 4-seeded: seeds not hollowed on the face: perennials, with linear thick and fleshy leaves.*

3. **P. maritima,** L. (SEASIDE PLANTAIN.) Leaves very fleshy or terete, entire, or rarely few-toothed, glabrous; spikes cylindrical or oblong; bracts ovate, convex, about the length of the broadly ovate or oval scarious sepals, which have a thick keel, that of the posterior sepals crested. — Var. JUNCOÌDES is usually more slender, the flowers often sparser, and the keel crestless. — Salt marshes on the coast from New Jersey northward; the var. only northward. (Eu.)

§ 3. *Flowers all perfect and alike; the 2 anterior scarious sepals generally united into one: corolla, stamens, &c. as in the first group: seeds (and ovules) 2, hollowed on the face: leaves flat, lanceolate, 3 - 5-ribbed.*

4. **P.** LANCEOLÀTA, L. (RIBGRASS. RIPPLEGRASS. ENGLISH PLANTAIN.) Mostly hairy; scape grooved-angled, slender (1°–2° high), much longer than the leaves; spike short and thick. ♃ — Dry fields, mostly eastward. (Nat. from Eu.)

§ 4. *Flowers all perfect and commonly fertile, but of 2 sorts on different plants, some with small anthers on short filaments, others with large anthers on long-exserted filaments: corolla glabrous, the broad round lobes widely spreading: seeds 2 (one in each cell), boat-shaped, deeply hollowed on the face: mostly annuals, with narrow woolly or hairy leaves.*

5. **P. Patagónica,** Jacq. Silky-woolly, or becoming naked; leaves 1–3-nerved; spike cylindrical or oblong, dense; sepals very obtuse, scarious, with a thick centre. (Found through almost the whole length of America.)

Var. **gnaphalioìdes.** White with silky wool; leaves varying from oblong-linear to filiform; spike very dense (½′–4′ long), woolly; bracts not exceeding the calyx. (P. Lagopus, *Pursh.* P. gnaphalioides, *Nutt.*) — Dry plains, W. Wisconsin ? and southwestward. — Runs through var. *spinulosa* and var. *nuda* into

Var. **aristàta.** Loosely hairy and green, or becoming glabrous; bracts awned, 2–3 times the length of the flowers. (P. aristata, *Michx.*, &c.) — Illinois and southward.

§ 5. *Flowers diœciously polygamous, or of 2 sorts; the mostly sterile ones with the usual large anthers on long capillary filaments, and the lobes of the corolla reflexed or spreading; the truly fertile with minute anthers on short included filaments and the corolla closed over the fruit in the form of a beak: stamens 4: pod 2-celled: seeds 1 or rarely 2 in each cell, nearly flat on the face: annuals or biennials, with rather obscurely and few-ribbed leaves.*

6. **P. Virgínica,** L. Hairy or hoary-pubescent (2′–9′ high); leaves oblong, varying to obovate and spatulate-lanceolate, 3–5-nerved, slightly or coarsely and sparingly toothed; spike dense, often interrupted or loose below; sepals ovate or oblong. (Includes many nominal species.) — Sandy grounds, Rhode Island to Kentucky and southward. May–Sept.

§ 6. *Flowers of 2 sorts as in § 5, but the stamens only 2, and the corolla of the truly fertile not so much closed: pod 2-celled: seeds 2–19 in each cell, not hollowed on the face: small annuals or biennials, with narrowly linear or awl-shaped and obscurely 1-ribbed leaves.*

7. **P. pusílla,** Nutt. Minutely pubescent (1′–4′ high); leaves entire; flowers crowded or scattered; *pod short-ovoid, 4-seeded,* little exceeding the calyx and bract. — Dry hills, New York to Illinois, and southward. April–Aug.

8. **P. heterophýlla,** Nutt. Leaves rather fleshy, acute, entire, or denticulate, or some of them below 2–4-lobed or toothed; scapes 2′–8′ high, including the long and slender spike of often scattered flowers; *pod oblong-conoidal, 10–28-seeded,* nearly twice the length of the calyx and bract. (P. pusilla, *Decaisne, in DC.*) — Low or sandy grounds, from Maryland southward. April–June.

ORDER 69. PLUMBAGINÀCEÆ. (LEADWORT FAMILY.)

Maritime herbs, chiefly stemless, with regular 5-merous flowers, a plaited calyx, the 5 stamens opposite the separate petals or the lobes of the corolla, and the free ovary one-celled, with a solitary ovule hanging from a long cord which rises from the base of the cell. — The STATICÈÆ or MARSH-ROSEMARY TRIBE alone is represented in our region by the genus

1. STÁTICE, Tourn. SEA-LAVENDER. MARSH-ROSEMARY.

Flowers scattered or loosely spiked and 1-sided on the branches, 2–3-bracted. Calyx funnel-form, dry and membranaceous, persistent. Corolla of 5 nearly or quite distinct petals, with long claws, the 5 stamens attached to their bases. Styles 5, rarely 3, separate. Fruit membranous and indehiscent, 1-seeded, in the bottom of the calyx. Embryo straight, in mealy albumen. — Sea-side perennials, with thick and stalked leaves; the flowering stems or scapes branched into panicles. (Στατική, an ancient name given to this or some other herb, on account of its astringency.)

1. **S. Limònium,** L. Leaves oblong, spatulate, or obovate-lanceolate, 1-ribbed, tipped with a deciduous bristly point, petioled; scape much-branched, corymbose-panicled (1°–2° high); spikelets 1–3-flowered; calyx-tube hairy on the angles, the lobes ovate-triangular, with as many teeth in the sinuses. — Root thick and woody, very astringent. Flowers lavender-color. (Eu.)

Var. **Caroliniàna** (S. Caroliniana, *Walt.*, &c.), the plant of the Northern States, has a hollow scape, with more erect branches, at length scattered flowers, and sharper calyx-lobes. — Salt marshes along the coast, extending northward (where it passes into S. Bahusiensis, *Fries*). Aug., Sept. (Eu.)

ARMÈRIA VULGÀRIS, the THRIFT of the gardens, is a native of Northern Canada as well as of Europe, but not of the United States proper.

ORDER 70. PRIMULÀCEÆ. (PRIMROSE FAMILY.)

Herbs, with opposite or alternate simple leaves, and regular perfect flowers, the stamens as many as the lobes of the monopetalous (rarely polypetalous) corolla and inserted opposite them on the tube, and a 1-celled ovary with a central free placenta rising from the base, bearing several or many seeds. — Calyx free from the ovary, or in Samolus partly coherent. (Corolla none in Glaux.) Stamens 4–5, rarely 6–8. Style and stigma one. Seeds with a small embryo in fleshy albumen, amphitropous and fixed by the middle, except in Tribe 4.

Synopsis.

TRIBE I. **PRIMULEÆ.** Pod entirely free from the calyx, opening by valves or teeth.

* Stemless: leaves all in a cluster from the root.

1. PRIMULA. Corolla funnel-form or salver-shaped, open at the throat. Stamens included.
2. ANDROSACE. Corolla short, constricted at the throat. Stamens included.

3. DODECATHEON. Corolla reflexed, 5-parted. Stamens exserted; filaments united.

* * Stems leafy: corolla wheel-shaped (or in Glaux none).

4. TRIENTALIS. Corolla mostly 7-parted. Stem leafy at the summit.
5. LYSIMACHIA. Corolla 5-parted, without intermediate teeth. Stems leafy.
6. NAUMBURGIA. Corolla of 5 or 6 petals, with intermediate teeth.
7. GLAUX. Corolla none: the calyx petal-like.

TRIBE II. **ANAGALLIDEÆ.** Pod free from the calyx, opening all round by a transverse line, the top falling off like a lid.

8. ANAGALLIS. Corolla longer than the calyx, 5-parted. Leaves opposite.
9. CENTUNCULUS. Corolla shorter than the calyx, 4-5-cleft. Leaves alternate.

TRIBE III. **SAMOLEÆ.** Pod partly adherent to the calyx, opening by valves.

10. SAMOLUS. Corolla bell-shaped and with 5 sterile filaments in the sinuses.

TRIBE IV. **HOTTONIEÆ.** Pod entirely free from the calyx, opening by valves. Seeds fixed by the base, anatropous.

11. HOTTONIA. Corolla salver-shaped. Immersed leaves pectinately dissected.

1. PRÍMULA, L. PRIMROSE. COWSLIP.

Calyx tubular, angled, 5-cleft. Corolla salver-shaped, enlarging above the insertion of the stamens; the 5 lobes often notched or inversely heart-shaped. Stamens 5, included. Pod many-seeded, splitting at the top into 5 valves or 10 teeth.—Low perennial herbs, producing a tuft of veiny leaves at the root, and simple scapes, bearing the flowers in an umbel. (Name a diminutive of *primus*, from the flowering of the true Primrose in early spring.)

1. **P. farinòsa,** L. (BIRD'S-EYE PRIMROSE.) Leaves elliptical or obovate-lanceolate, *the lower surface* and the 3-20-flowered *involucre, &c. covered with a white mealiness:* corolla pale lilac with a yellow eye.—Shores of Lakes St. Clair, Huron, and northward. June, July.—Scape 3′-10′ high. (Eu.)

2. **P. Mistassínica,** Michx. Leaves spatulate or wedge-oblong, thin and veiny, *not mealy;* involucre 1-8-flowered; lobes of the flesh-colored corolla broadly and deeply obcordate.—Shores of the Upper Lakes: also Crooked Lake (*Sartwell*) and Annsville, Oneida County, New York (*Knieskern* and *Vasey*), Willoughby Mountain, Vermont (*Wood, &c.*), and northward. May.—A pretty species, 2′-6′ high. (Eu.)

P. VÈRIS and P. VULGÀRIS are the COWSLIP and PRIMROSE of Europe, from which various cultivated varieties are derived.

2. ANDRÓSACE, Tourn. ANDROSACE.

Calyx 5-cleft; the tube short. Corolla salver-shaped or funnel-form, the tube shorter than the calyx, contracted at the throat; the limb 5-parted. Stamens and style included. Pod 5-valved.—Small herbs, with clustered root-leaves and very small solitary or umbelled flowers. (An old name, composed of ἀνδρός, *of man*, and σάκος, *a shield:* unmeaning.)

1. **A. occidentàlis,** Pursh. Smoothish; scapes diffuse (2′-4′ high), many-flowered; leaves and leaflets of the involucre oblong-ovate, entire, sessile; calyx-lobes leafy, triangular-lanceolate, longer than the (white) corolla. ①—Banks of the Mississippi, Illinois, and northwestward.

3. DODECÁTHEON, L. American Cowslip.

Calyx deeply 5-cleft; the divisions lanceolate, reflexed. Corolla with a very short tube, a thickened throat, and a 5-parted reflexed limb; the divisions long and narrow. Filaments short, monadelphous at the base: anthers long and linear, approximate in a slender cone. — Perennial smooth herbs, with fibrous roots, a cluster of oblong or spatulate leaves, and a simple naked scape, involucrate at the summit, bearing an ample umbel of showy flowers, usually nodding on slender peduncles. Corolla purple-rose-color, or sometimes white. (Name fancifully assumed from δώδεκα, *twelve*, and θεοί, *gods*.)

1. **D. Meàdia,** L. — Rich woods, Penn. and Maryland to Wisconsin, and southwestward. May, June. — Very handsome in cultivation. In the West called Shooting-Star.

4. TRIENTÀLIS, L. Chickweed-Wintergreen.

Calyx mostly 7-parted; the divisions linear-lanceolate, pointed. Corolla mostly 7-parted, spreading, flat, without any tube. Filaments slender, united in a ring at the base: anthers oblong, revolute after flowering. Pod few-seeded. — Low and smooth perennials, with simple erect stems, bearing a few alternate usually minute and scale-like leaves below, and a whorl of very delicate veiny leaves at the summit. Peduncles one or more, very slender, bearing a delicate white and star-shaped flower. (A Latin name, meaning the third part of a foot, alluding to the size of the plant.)

1. **T. Americàna,** Pursh. (Star-flower.) Leaves elongated-lanceolate, tapering to both ends; petals finely pointed. — Damp cold woods; common northward, and southward in the mountains. May.

5. LYSIMÀCHIA, L. Loosestrife.

Calyx 5-parted. Corolla with a very short tube, and a spreading 5-parted limb. Stamens 5: filaments often united in a ring at the base. Pod globose, 5–10-valved, few–many-seeded. (Parts of the flower rarely in fours or sixes.) — Perennial herbs, with entire leaves, and axillary or racemed flowers: corolla mostly yellow. (Named in honor of King *Lysimachus*, or from λύσις, *a release from*, μάχη, *strife*.)

§ 1. TRIDÝNIA, Raf. — *Leaves opposite or whorled, sessile, dotted: calyx and golden-yellow corolla streaked with dark lines: filaments mostly unequal, plainly monadelphous at the base, with no interposed sterile ones: anthers short: pod* 5-*valved, ripening only* 2–5 *seeds.*

1. **L. stricta,** Ait. Smooth, at length branched, very leafy; *leaves opposite* or rarely alternate, lanceolate, acute at each end; *flowers* on slender pedicels *in a long raceme* (5′–12′), which is leafy at the base; or, in var. PRODÚCTA, leafy for fully half its length: lobes of the corolla lance-oblong. Low grounds; common. June–Aug. — Stems 1°–2° high, often bearing oblong bulblets in the axils.

2. **L. quadrifòlia,** L. Somewhat hairy; stem simple (1°–2° high); *leaves whorled* in fours or fives (rarely in threes or sixes) ovate-lanceolate; *flowers* on long capillary peduncles *from the axils of the leaves;* lobes of the corolla ovate-oblong.—Moist or sandy soil; common. June.—A variety has the leaves varying to opposite and partly alternate, some of the upper reduced to bracts shorter than the peduncles. (Near New York, Washington, &c.)

§ 2. STEIRONÈMA, Raf.—*Leaves opposite, not dotted, glabrous, mostly ciliate at the base: flowers nodding on slender peduncles from the axils of the upper leaves: corolla light yellow, not streaked or dotted; the lobes broadly ovate, pointed, with undulate or denticulate margins, scarcely exceeding the sepals: filaments nearly equal, scarcely monadelphous, with the rudiments of a sterile set interposed at the base in the form of slender teeth or processes: anthers linear, at length curved: pod 5–10-valved, or bursting irregularly,* 10–20-*seeded.*

3. **L. ciliàta,** L. *Stem erect* (2°–3° high), *leaves lanceolate-ovate* (3′–6′ long), tapering to an acute point, *rounded or heart-shaped at the base,* all on long and fringed petioles; *corolla longer than the calyx.*—Low ground and thickets; common. July.

4. **L. radìcans,** Hook. *Stem slender, soon reclined,* the elongated branches often rooting in the mud; *leaves ovate-lanceolate, mostly rounded at the base, on slender petioles:* corolla about the length of the calyx.—Swampy river-banks, W. Virginia (*Aikin*) and southward.—Leaves and flowers nearly one half smaller than in the last.

5. **L. lanceolàta,** Walt. *Stem erect* (10′–20′ high); *leaves lanceolate, varying to oblong and to linear, narrowed into a short margined petiole* or tapering base, or the lowest short and broad on long petioles.—Var. HÝBRIDA is the broader-leaved form. Var. ANGUSTIFÒLIA (L. angustifolia, *Lam.*), a slender branching form, with the upper leaves narrowly lanceolate or linear, and acute at both ends.—Low grounds; common, especially westward. June–Aug.

6. **L. longifòlia,** Pursh. *Stem erect,* 4-angled, slender (1°–3° high), often branched below; stem-*leaves sessile, narrowly linear, elongated* (2′–4′ long, 2″–3″ wide), smooth and shining, rather rigid, obtuse, the margins often a little revolute, the veins obscure; the lowest oblong or spatulate; corolla (⅜′–¾′ broad) longer than the calyx, the lobes conspicuously pointed. (L. revolùta, *Nutt.*)—Wet banks, W. New York and Penn. to Wisconsin. July–Sept.

6. NAUMBÚRGIA, Mœnch. TUFTED LOOSESTRIFE.

Calyx 6- (5–7-) parted. Corolla 6- (5–7-) parted almost or quite to the base; the spreading divisions lance-linear, with a small tooth interposed between each. Filaments exserted, distinct. Pod few-seeded.—Perennial, with a simple stem, and opposite lanceolate entire leaves, which are dotted, like the yellow flower, &c., with purplish glands. Flowers small, densely crowded in stalked spikes or close racemes, from the axils of the middle leaves. (Named for *J. S. Naumburg,* an early German botanist.)

1. **N. thyrsiflòra,** Reichenb. (Lysimachia thyrsiflora, *L.* L. capitata, *Pursh.*)—Cold swamps; common northward. June. (Eu.)

7. GLAÙX, L. Sea-Milkwort.

Calyx bell-shaped, 5-cleft; the lobes ovate, petal-like. Corolla wanting. Stamens 5, on the base of the calyx, alternate with its lobes. Pod 5-valved, few-seeded. — A low and leafy fleshy perennial, with opposite oblong and entire sessile leaves, and solitary nearly sessile (purplish and white) flowers in their axils. (An ancient Greek name, from γλαυκός, *sea-green*.)

1. **G. marítima,** L. — Sea-shore of New England from Cape Cod northward. June. (Eu.)

8. ANAGÁLLIS, Tourn. Pimpernel.

Calyx 5-parted. Corolla wheel-shaped, with almost no tube, 5-parted, longer than the calyx; the divisions broad. Stamens 5: filaments bearded. Pod membranaceous, circumcissile, the top falling off like a lid, many-seeded. — Low, spreading or procumbent herbs, with opposite or whorled entire leaves, and solitary flowers on axillary peduncles.

1 **A. arvénsis,** L. (Common Pimpernel.) Leaves ovate, sessile, shorter than the peduncles; petals obovate, obtuse, fringed with minute teeth. ① — Waste sandy fields. June – Aug. — Flowers variable in size, scarlet, sometimes purple, blue, or white, quickly closing at the approach of bad weather; whence the popular name of "*Poor Man's Weather-glass.*" (Nat. from Eu.)

9. CENTÚNCULUS, L. Chaffweed.

Calyx 4 – 5-parted. Corolla shorter than the calyx, 4 – 5-cleft, wheel-shaped, with an urn-shaped short tube, usually withering on the summit of the pod (which is like that of Anagallis). Stamens 4 – 5: filaments beardless. — Very small annuals, with alternate entire leaves, and solitary inconspicuous flowers in their axils. (Derivation obscure.)

1. **C. mínimus,** L. Stems ascending (2′ – 5′ long); leaves ovate, obovate, or spatulate-oblong; flowers nearly sessile, the parts mostly in fours. (C. lanceolatus, *Michx.*) — Low grounds, Illinois and southward. (Eu.)

10. SÁMOLUS, L. Water Pimpernel. Brook-weed.

Calyx 5-cleft; the tube adherent to the base of the ovary. Corolla somewhat bell-shaped, 5-cleft, commonly with 5 sterile filaments in the sinuses. Stamens 5, on the tube of the corolla, included. Pod 5-valved at the summit, many-seeded. — Smooth herbs, with alternate entire leaves, and small white flowers in racemes. ("According to Pliny, an ancient Druidical name, probably same as *slanlus* in Celtic, *the healing-herb*.")

1. **S. Valerándi,** L. Stem erect (6′ – 12′ high), leafy; leaves obovate; bracts none; bractlets on the middle of the slender ascending pedicels; calyx-lobes ovate, shorter than the corolla. (Eu.)

Var. **Americànus.** More slender, becoming diffusely branched; racemes often panicled, the pedicels longer and spreading; bractlets, flowers, and pods smaller. (S. floribúndus, *H. B. K.*) — Wet places; common. June – Sept.

11. HOTTÒNIA, L. FEATHERFOIL. WATER VIOLET.

Calyx 5-parted, the divisions linear. Corolla salver-shaped, with a short tube; the limb 5-parted. Stamens 5, included. Pod many-seeded, 5-valved; the valves cohering at the base and summit. Seeds attached by their base, anatropous. — Aquatic perennials, with the immersed leaves pectinate, and the erect hollow flower-stems almost leafless. Flowers white or whitish, whorled at the joints, forming a sort of interrupted raceme. (Named for *Prof. Hotton*, a botanist of Leyden, in the 17th century.)

1. **H. inflàta,** Ell. Leaves dissected into thread-like divisions, scattered on the floating and rooting stems, and crowded at the base of the cluster of peduncles, which are strongly inflated between the joints; pedicels, corolla, anthers, and style short. — Pools and ditches, New England to Kentucky, and southward. June. — The singularly inflated peduncles are often as thick as one's finger.

ORDER 71. LENTIBULÀCEÆ. (BLADDERWORT FAMILY.)

Small herbs (growing in water or wet places), with a 2-lipped calyx, and a 2-lipped personate corolla, 2 *stamens with (confluently) one-celled anthers, and a one-celled ovary with a free central placenta, bearing several anatropous seeds, with a thick straight embryo, and no albumen.* — Corolla deeply 2-lipped, spurred at the base in front; the palate usually bearded. Ovary free: style very short or none: stigma 1 – 2-lipped, the lower lip larger and revolute over the approximate anthers. Pod often bursting irregularly. Scapes 1 – few-flowered. — A small family, consisting mostly of the two following genera: —

1. UTRICULÀRIA, L. BLADDERWORT.

Lips of the 2-parted calyx entire, or nearly so. Corolla personate, the palate on the lower lip projecting, and often closing the throat. — Aquatic and immersed, with capillary dissected leaves bearing little bladders, which are filled with air and float the plant at the time of flowering; or rooting in the mud, and sometimes with few or no leaves or bladders. Scapes 1 – few-flowered. (Name from *utriculus*, a little bladder.)

* *Upper leaves in a whorl on the otherwise naked scape, floating by means of large bladders formed of the inflated petioles; the lower dissected and capillary, bearing little bladders: rootlets few or none.*

1. **U. inflàta,** Walt. (INFLATED BLADDERWORT.) Swimming free; bladder-like *petioles* oblong, pointed at the ends, and branched near the apex, bearing fine thread-like divisions; flowers 5 – 10 (large, yellow); the appressed spur half the length of the corolla; *style distinct.* — Ponds, Maine to Virginia, and southward, near the coast. Aug.

* * *Scapes naked (except some small scaly bracts), from immersed branching stems, which commonly swim free, and bear capillary dissected leaves furnished with small*

air-bladders on their lobes: roots few and not affixed, or none. (*Mostly perennial, propagated from year to year by a sort of buds.*)

+– *Flowers all alike, yellow, several in a raceme: pedicels nodding in fruit.*

2. **U. vulgàris,** L. (GREATER BLADDERWORT.) Immersed stems (1°–3° long) *crowded with 2–3-pinnately many-parted capillary leaves, bearing many bladders;* scapes 5–12-flowered (6'–12' long); lips of the *corolla closed,* the sides reflexed; spur conical, stretched out towards the lower lip, shorter than it. —Ponds and slow streams; common. June–Aug.—Corolla ½'–¾' broad; the spur rather less broad and blunt than in the European plant. (Eu.)

3. **U. minor,** L. (SMALLER BLADDERWORT.) *Leaves scattered* on the thread-like immersed stems, 2–4 times *forked,* short; scapes weak, 3–7-flowered (3'–7' high); *upper lip of the gaping corolla not longer than the depressed palate; spur very short, blunt, turned down, or almost none.*—Shallow water, N. New York to Wisconsin, and northward. July.—Corolla 2''–3'' broad. (Eu.)

+– +– *Flowers of 2 sorts; viz. the usual sort* (3–7) *in a raceme, their pedicels ascending, the corolla yellow; and more fertile ones solitary and scattered along the leafy stems, on short soon reflexed peduncles, fruiting in the bud, the corolla minute and never expanding.*

4. **U. clandestìna,** Nutt. Leaves numerous on the slender immersed stems, several times forked, capillary, copiously bladder-bearing; scapes slender (3'–5' high); lips of the corolla nearly equal in length, the lower broader and 3-lobed, somewhat longer than the approximate thick and blunt spur.—Ponds, E. Massachusetts, Rhode Island, W. New York, and New Jersey July.—Flowers as large as in No. 7.

+– +– +– *Flowers all alike, few* (1–5): *pedicels erect in fruit.*

++ *Corolla yellow: scape and pedicels filiform.*

5. **U. intermèdia,** Hayne. *Leaves* crowded on the immersed stems, *2-ranked,* 4–5 *times forked, rigid;* the divisions linear-awl-shaped, minutely bristle-toothed along the margins, *not bladder-bearing,* the bladders being on separate leafless branches; *upper lip of the corolla much longer than the palate; spur conical-oblong, acute, appressed to the lower lip and nearly as long as it.*—Shallow pools, New England to Ohio, Wisconsin, and northward: rare. June, July.—Leafy stems 3'–6' long. Scapes 3'–7' high. Flowers ½' broad. (Eu.)

6. **U. striàta,** Le Conte. *Leaves* crowded or whorled on the small immersed stems, *several times forked,* capillary, *bladder-bearing;* flowers 2–5, on long pedicels; lips of the corolla nearly equal, broad and expanded, the upper undulate, concave, plaited-striate in the middle; *spur nearly linear, obtuse, approaching and almost equalling the lower lip.*—Shallow pools in pine barrens, Long Island, New Jersey, and southward. July, Aug.—Scape 8'–12' high. Flowers ½' broad.

7. **U. gibba,** L. *Scape* (1'–3' high), 1–2-*flowered,* at the base furnished with very slender short branches, bearing sparingly dissected capillary root-like leaves, with scattered bladders; lips of the corolla broad and rounded, nearly equal; the *lower* with the sides reflexed (4''–5'' long), *exceeding the approximate thick and blunt gibbous spur.*—Shallow water, Massachusetts to Pennsylvania, and southward along the mountains. June–Aug.

++ ++ *Corolla violet-purple.*

8. **U. purpùrea,** Walt. (PURPLE BLADDERWORT.) Leaves whorled along the long immersed free floating stems, petioled, decompound, capillary, bearing many bladders; flowers 2-4 (½' wide); spur appressed to the lower 3-lobed 2-saccate lip of the corolla and about half its length.—Ponds, Maine to Virginia, and southward. Aug., Sept.—Scape 3'-6' high, not scaly below.

* * * *Scape solitary, slender and naked, or with a few small scales, the base rooting in the mud or soil: leaves small, awl-shaped or grass-like, often raised out of the water, commonly few or fugacious: air-bladders few on the leaves or rootlets, or none.*

+ *Flower purple, solitary: leaves bearing a few delicate lobes.*

9. **U. resupinàta,** Greene. Scape (2'-8' high) 2-bracted above; leaves thread-like, on delicate creeping branches; corolla (4''-5'' long) deeply 2-parted; spur oblong-conical, very obtuse, shorter than the dilated lower lip and remote from it, *both ascending*, the flower resting transversely on the summit of the scape. —Sandy margins of ponds, Maine (*Mr. Chute*), E. Massachusetts, and Rhode Island. Aug.

+ + *Flowers* 2-10, *yellow: leaves entire, rarely seen.*

10. **U. subulàta,** L. (TINY BLADDERWORT.) Stem capillary (3'-5' high); *pedicels capillary; lower lip of the corolla flat* or with its margins recurved, *equally 3-lobed,* much larger than the ovate upper one; *spur oblong,* acute, straight, *appressed* to the lower lip, which it nearly equals in length.—Sandy swamps, pine-barrens of New Jersey, Virginia, and southward. June.—Corolla 3''-4'' broad.

11. **U. cornùta,** Michx. (HORNED BLADDERWORT.) Stem strict (½°-1° high), 2-10-flowered; *pedicels not longer than the calyx; lower lip of the corolla large and helmet-shaped,* its centre very convex and projecting, while the sides are strongly reflexed; upper lip obovate and much smaller; *spur awl-shaped, turned downward* and outward, about as long as the lower lip.—Peat-bogs, or sandy swamps; common. June-Aug.—Flowers close together, large.

2. PINGUÍCULA, L. BUTTERWORT.

Upper lip of the calyx 3-cleft, the lower 2-cleft. Corolla with an open hairy or spotted palate.—Small and stemless perennials, growing on damp rocks, with 1-flowered scapes, and broad and entire leaves, all clustered at the root, soft-fleshy, mostly greasy to the touch (whence the name, from *pinguis*, fat).

1. **P. vulgàris,** L. Leaves ovate or elliptical; scape and calyx a little pubescent; lips of the violet corolla very unequal, the tube funnel-form; spur straightish.—Wet rocks, W. New York to Lake Superior, and northward July. (Eu.)

ORDER 72. BIGNONIÀCEÆ. (BIGNONIA FAMILY.)

Woody or rarely herbaceous plants, monopetalous, didynamous or diandrous, with the ovary commonly 2-celled by the meeting of the two placentæ or of a projection from them, many-seeded: the large seeds with a flat embryo and no albumen.—Calyx 2-lipped, 5-cleft, or entire. Corolla tubular or bell-shaped, 5-lobed, somewhat irregular and 2-lipped, deciduous; the lower lobe largest. Stamens inserted on the corolla; the fifth or posterior one, and sometimes the shorter pair also, sterile or rudimentary: anthers of 2 diverging cells. Ovary free, bearing a long style, with a 2-lipped stigma. — Leaves compound or simple, opposite, rarely alternate. Flowers large and showy. — Chiefly a tropical family; only two species indigenous within our limits. It includes two suborders, viz: —

SUBORDER I. BIGNONIEÆ. THE TRUE BIGNONIA FAMILY.

Woody plants, with 1 – 2-celled and 2-valved pods, the valves separating from the partition when there is any. Seeds transverse, very flat, winged; the broad and leaf-like cotyledons notched at both ends.

1. BIGNONIA. Pod flattened parallel with the partition. Leaves compound.
2. TECOMA. Pod with the convex valves contrary to the partition. Leaves compound.
3. CATALPA. Pod as in No. 2. Leaves simple. Fertile stamens only 2.

SUBORDER II. SESAMEÆ. THE SESAMUM FAMILY.

Herbs, with the fruit more or less 4 – 5-celled. Seeds attached by one end, not winged; the cotyledons thick and entire.

4. MARTYNIA. Fertile stamens 2 or 4. Fruit fleshy without and woody within, beaked.

1. BIGNÒNIA, Tourn. BIGNONIA.

Calyx truncate, or slightly 5-toothed. Corolla somewhat bell-shaped, 5-lobed and rather 2-lipped. Stamens 4, often showing a rudiment of the fifth. Pod long and narrow, 2-celled, flattened parallel with the valves and partition. Seeds transversely winged. — Woody vines, with chiefly compound leaves, climbing by tendrils. (Named for the *Abbé Bignon.*)

1. **B. capreolàta,** L. Smooth; leaves of 2 ovate or oblong leaflets and a branched tendril, often with a pair of accessory leaves in the axil resembling stipules; peduncles few and clustered, 1-flowered. — Rich soil, Virginia, Kentucky, Illinois, and southward. April. — Stems climbing tall trees; a transverse section of the word showing a cross. Corolla orange, 2′ long. Pod 6′ long. Seeds with the wing 1½′ long.

2. TÉCOMA, Juss. TRUMPET-FLOWER.

Calyx bell-shaped, 5-toothed. Corolla funnel-form, 5-lobed, a little irregular. Stamens 4. Pod long and narrow, 2-celled, the partition contrary to the convex valves. Seeds transversely winged. — Woody vines, with compound leaves. (Abridged from the Mexican name.)

1. **T. radìcans,** Juss. (TRUMPET CREEPER.) Climbing by rootlets; leaves pinnate; leaflets 5 – 11, ovate, pointed, toothed; flowers corymbed; stamens not protruded beyond the tubular-funnel-form corolla. (Bignonia radicans, *L.*) — Rich soil, Pennsylvania to Illinois and southward; but cultivated farther north. July. — Corolla 2′ – 3′ long, orange and scarlet, showy.

3. CATÁLPA, Scop., Walt. CATALPA. INDIAN BEAN.

Calyx deeply 2-lipped. Corolla bell-shaped, swelling; the undulate 5-lobed spreading border irregular and 2-lipped. Fertile stamens 2, or sometimes 4; the 1 or 3 others sterile and rudimentary. Pod very long and slender, nearly cylindrical, 2-celled; the partition contrary to the valves. Seeds broadly winged on each side, the wings cut into a fringe. (The aboriginal name.)

1. **C.** BIGNONIOÌDES, Walt. Leaves heart-shaped, pointed, downy beneath; flowers in open compound panicles. — Cultivated in the Northern States: a well-known ornamental tree, with large leaves, and showy flowers, which are white, slightly tinged with violet, and dotted with purple and yellow in the throat, opening in July. Pods hanging till the next spring, often 1° long. (Adv from S. W. States?)

4. MARTÝNIA, L. UNICORN-PLANT.

Calyx 5-cleft, mostly unequal. Corolla gibbous, bell-shaped, 5-lobed and somewhat 2-lipped. Fertile stamens 4, or only 2. Pod fleshy, and with the inner part soon woody, terminated by a long beak, which at length splits into 2 hooked horns, and opens at the apex between the beaks, imperfectly 5-celled, owing to the divergence of the two plates of each of the two partitions or placentæ, leaving a space in the centre, while by reaching and cohering with the walls of the fruit they form 4 other cells. Seeds several, wingless, with a thick and roughened coat. — Low branching annuals, clammy-pubescent, exhaling a heavy odor: stems thickish: leaves simple, rounded. Flowers racemed, large. (Dedicated to *Prof. Martyn*, of Cambridge, a well-known botanist of the last century.)

1. **M.** PROBOSCÍDEA, Glox. Leaves heart-shaped, oblique, entire, or undulate, the upper alternate; the woody endocarp crested on one side, long-horned. — Escaped from gardens in some places. Corolla dull white, tinged or spotted with yellow and purplish. (Adv. from S. W. States.)

ORDER 73. OROBANCHÀCEÆ. (BROOM-RAPE FAMILY.)

Herbs destitute of green foliage (root-parasites), monopetalous, didynamous, the ovary one-celled with 2 or 4 parietal placentæ; pod very many-seeded: seeds minute, with albumen, and a very minute embryo. — Calyx persistent, 4–5-toothed or parted. Corolla tubular, more or less 2-lipped, ringent, persistent and withering; the upper lip entire or 2-lobed, the lower 3-lobed. Stamens 4, didynamous, inserted on the tube of the corolla: anthers 2-celled, persistent. Ovary free, ovoid, pointed with a long style which is curved at the apex: stigma large. Pod 1-celled, 2-valved; the valves each bearing on their face one placenta or a pair. Seeds very numerous, minute, anatropous, with a minute embryo at the base of transparent albumen. — Low, thick or fleshy herbs, bearing scales in place of leaves, lurid yellowish, or brownish throughout. Flowers solitary or spiked.

Synopsis.

*** Flowers of two sorts.**

1. EPIPHEGUS. Upper flowers sterile, with a tubular corolla; the lower fertile, with the corolla minute and not expanding. Bracts inconspicuous.

*** * Flowers all alike and perfect.**

2. CONOPHOLIS. Flowers spiked. Calyx with 2 bractlets, split on the lower side. Stamens protruded. Corolla 2-lipped.

3. PHELIPÆA. Flowers spiked or panicled. Calyx with 2 bractlets, regularly 5-cleft. Corolla 2-lipped. Stamens included.

4. APHYLLON. Flowers solitary, without bractlets. Calyx regularly 5-cleft. Corolla almost regular. Stamens included.

1. EPIPHÈGUS, Nutt. BEECH-DROPS. CANCER-ROOT.

Flowers racemose or spiked, scattered on the branches; the upper sterile, with a long tubular corolla and long filaments and style; the lower fertile, with a very short corolla which seldom opens, but is forced off from the base by the growth of the pod; the stamens and style very short. Calyx 5-toothed. Stigma capitate, a little 2-lobed. Pod 2-valved at the apex, with 2 approximate placentæ on each valve. — Herbs slender, purplish or yellowish-brown, much branched, with small and scattered scales, 6′ – 12′ high. (Name composed of ἐπί, *upon*, and φηγός, *the Beech*, because it grows on the roots of that tree.)

1. **E. Virginiàna,** Bart. (E. Americànus, *Nutt.*) — Common under the shade of Beech-trees, parasitic on their roots. Aug. - Oct. — Corolla of the upper (sterile) flowers whitish and purple, 6″ – 8″ long, curved, 4-toothed.

2. CONÓPHOLIS, Wallr. SQUAW-ROOT. CANCER-ROOT.

Flowers in a thick scaly spike, perfect, with 2 bractlets at the base of the irregularly 4 – 5-toothed calyx; the tube split down on the lower side. Corolla tubular, swollen at the base, strongly 2-lipped; the upper lip arched, notched at the summit; the lower shorter, 3-parted, spreading. Stamens protruded. Stigma depressed. Pod with 4 placentæ, approximate in pairs on the middle of each valve. — Upper scales forming bracts to the flowers; the lower covering each other in regular order, not unlike those of a fir-cone (whence the name, from κῶνος, *a cone*, and φολίς, *a scale*).

1. **C. Americàna,** Wallroth. (Orobánche Americana, *L.*) — Oak woods; not rare, growing in clusters among fallen leaves. May, June. — A singular plant, chestnut-colored or yellowish throughout, as thick as a man's thumb, 3′ – 6′ long, covered with scales, which are at first fleshy, then dry and hard.

3. PHELIPÆA, Tourn. BROOM-RAPE.

Flowers perfect, crowded in a spike, raceme, or clustered panicle, with a pair of bractlets at the base of the regular 4 – 5-cleft calyx. Corolla 2-lipped; the upper lip 2-lobed or notched; the lower 3-parted. Stamens included. Ovary with a gland at the base on the upper side. Pod with 4 placentæ, two on the middle of each valve. — Stems rather thick, scaly. (Named for *L. & J. Phelipeaux*, patrons of science in the time of Tournefort.)

1. **P. Ludoviciàna,** Don. Glandular-pubescent, branched (3′–12′ high); the flowers spiked in close clusters; corolla somewhat curved, twice the length of the narrow lanceolate calyx-lobes; the lips equal in length. — Illinois (*Mr. E. Hall*) and westward. Oct.

4. APHÝLLON, Mitchell. NAKED BROOM-RAPE.

Flowers perfect, solitary on long naked scapes or peduncles, without bractlets. Calyx 5-cleft, regular. Corolla with a long curved tube and a spreading border, somewhat 2-lipped; the upper lip deeply 2-cleft, its lobes similar to the 3 of the lower lip. Stamens included. Stigma broadly 2-lipped. Capsule with 4 equidistant placentæ, 2 borne on each valve half-way between the midrib and the margin. Plants brownish or yellowish. Flowers purplish, and scapes minutely glandular-pubescent. (Name from *a* privative and φύλλον, *foliage*, alluding to the naked stalks.) — Perhaps rather a section of Phelipæa.

1. **A. uniflòrum,** Torr. & Gr. (ONE-FLOWERED CANCER-ROOT.) *Stem subterranean or nearly so, very short*, scaly, often branched, each branch sending up 1–3 slender one-flowered scapes (3′–5′ high); *divisions of the calyx lance-awl-shaped*, half the length of the corolla. (Orobanche uniflora, *L.*) — Woods; rather common. April, May. — Corolla 1′ long, with 2 yellow bearded folds in the throat, the lobes obovate.

2. **A. fasciculàtum,** Torr. & Gr. *Scaly stem erect and rising 3′–4′ out of ground*, mostly longer than the crowded peduncles; *divisions of the calyx triangular, very much shorter than the corolla*, which has rounded short lobes. (Orobanche fasciculata, *Nutt.*) — Islands in Lake Huron (*Engelmann*), and northward. May.

ORDER 74. SCROPHULARIÀCEÆ. (FIGWORT FAMILY.)

Chiefly herbs, with didynamous or diandrous (or very rarely 5 perfect) stamens inserted on the tube of the 2-lipped or more or less irregular corolla, the lobes of which are imbricated in the bud: fruit a 2-celled and usually many-seeded pod with the placentæ in the axis: seeds anatropous with a small embryo in copious albumen. — Style single: stigma entire or 2-lobed. Leaves and inflorescence various; but the flowers not terminal in any genuine representatives of the order. — A large order of bitterish, some of them narcotic-poisonous plants, represented by two great groups (which are not different enough to be classed as suborders*); — to which an anomalous genus (Gelsemium) is appended, since no better place has yet been found for it.

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* The technical distinction between the so-called suborders is principally in the æstivation of the corolla, which is not likely to be entirely constant. Some years ago, my former pupil, Mr. Henry James Clark, showed me that in Mimulus one or both of the lateral lobes of the lower lip are occasionally exterior in the bud, and I have since noticed a similar exception in anomalous Pentstemon.

The plants of Tribes 8, 9, and 10 (which incline to turn blackish in drying), are most, if not all, of them partial root-parasites. This has been for some time known in Tribe 10; and has lately been shown to be the case in Gerardia also, by Mr. Jacob Stauffer, of Mount Joy, Pennsylvania.

Synopsis.

I. ANTIRRHINIDEÆ. Upper lip of the corolla covering the lower in the bud (with occasional exceptions in Mimulus, &c.). Pod usually septicidal.

Tribe I. VERBASCEÆ. Corolla nearly wheel-shaped. Flowers in a simple spike or raceme. Leaves all alternate.

1. **VERBASCUM.** Stamens 5, all with anthers, and 3 or all of them with bearded filaments.

Tribe II. ANTIRRHINEÆ. Corolla tubular, with a spur or sac at the base below, the throat usually with a palate. Pod opening by chinks or holes. Flowers in simple racemes or axillary. Lower leaves usually opposite or whorled.

2. **LINARIA.** Corolla spurred at the base; the palate seldom closing the throat.
3. **ANTIRRHINUM.** Corolla merely saccate at the base; the palate closing the throat.

Tribe III. CHELONEÆ. Corolla tubular, or deeply 2-lipped, not spurred nor saccate below. Pod 2-4-valved. Leaves opposite. Inflorescence compound; the flowers in small clusters or cymes in the axils of the leaves or bracts; the clusters spiked or racemed. (Stamens 4, and the rudiment of the fifth.)

4. **SCROPHULARIA.** Corolla inflated, globular or oblong, with 4 short erect lobes and one spreading one. Rudiment of the sterile stamen a scale.
5. **COLLINSIA.** Corolla 2-cleft, the short tube saccate on the upper side; the middle lobe of the lower lip sac-like and enclosing the declined stamens.
6. **CHELONE.** Corolla tubular, inflated above. Sterile stamen shorter than the others Seeds winged.
7. **PENTSTEMON.** Corolla tubular. Sterile stamen about as long as the rest. Seeds wingless.

Tribe IV. GRATIOLEÆ. Corolla tubular, not saccate nor spurred. Pod 2-valved. Inflorescence simple; the flowers single in the axil of the bracts or leaves, the peduncles bractless. Leaves all or the lower opposite.

* Stamens 4, all anther-bearing and similar.

8. **MIMULUS.** Calyx prismatic, 5-angled, 5-toothed. Corolla elongated.
9. **CONOBEA.** Calyx 5-parted, the divisions equal. Corolla short.
10. **HERPESTIS.** Calyx 5-parted, unequal, the upper division largest. Corolla short.

* * Anther-bearing stamens 2: sometimes also a pair of sterile filaments.

11. **GRATIOLA.** Calyx 5-parted. Stamens included; the sterile pair short or none.
12. **ILYSANTHES.** Calyx 5-parted. Stamens included; the sterile filaments protruded.
13. **HEMIANTHUS.** Calyx 4-toothed. Sterile filaments none. Corolla irregular.

II. RHINANTHIDEÆ. Under lip or the lateral lobes of the corolla covering the upper in the bud. Pod commonly loculicidal.

Tribe V. SIBTHORPIEÆ. Corolla wheel-shaped or bell-shaped. Leaves alternate, or (with the axillary flowers) fascicled in clusters.

14 **LIMOSELLA.** Calyx 5-toothed. Corolla 5-cleft. Stamens 4. Leaves fleshy.

Tribe VI. DIGITALEÆ? Corolla tubular or somewhat bell-shaped. Leaves alternate. Flowers in a spike or raceme.

15. **SYNTHYRIS.** Calyx 4-parted. Corolla irregular. Stamens 2, rarely 4.

Tribe VII. VERONICEÆ. Corolla wheel-shaped or salver-shaped. Stamens not approaching each other. Leaves mostly opposite. Flowers in racemes.

16. **VERONICA.** Calyx 4- (rarely 3-5-) parted. Corolla somewhat irregular. Stamens 2.

Tribe VIII. BUCHNEREÆ. Corolla salver-shaped. Stamens 4, approximate in pairs: anthers 1-celled. Upper leaves alternate. Flowers in a spike.

17. BUCHNERA. Calyx tubular, 5-toothed. Limb of the salver-shaped elongated corolla 5-cleft.

TRIBE IX. **GERARDIEÆ.** Corolla inflated or tubular, with a spreading and slightly unequal 5-lobed limb. Stamens 4, approximate in pairs: anthers 2-celled. Leaves opposite, or the uppermost alternate.

18. SEYMERIA. Calyx deeply 5-cleft. Tube of the corolla broad, not longer than the lobes. Stamens nearly equal.

19 GERARDIA. Calyx 5-toothed or cleft. Stamens strongly unequal.

TRIBE X. **EUPHRASIEÆ.** Corolla tubular, 2-lipped; the upper lip narrow, erect or arched, enclosing the 4 strongly didynamous stamens. Flowers spiked.

* Anther-cells unequal and separated. Pod many-seeded.

20. CASTILLEIA. Calyx cleft down the lower, and often also on the upper, side.

* * Anther-cells equal. Pod many-several-seeded.

21. SCHWALBEA. Calyx 5-toothed, very oblique, the upper tooth smallest.
22. EUPHRASIA. Calyx 4-cleft. Upper lip of the corolla 2-lobed. Pod oblong.
23. RHINANTHUS. Calyx inflated, ovate. Pod orbicular: seeds winged.
24. PEDICULARIS. Calyx not inflated. Pod ovate or sword-shaped: seeds wingless.

* * * Anther-cells equal. Pod 1-4-seeded.

25. MELAMPYRUM. Calyx 4-cleft. Ovary 2-celled, 4-ovuled. Pod flat, oblique.

⁂ GELSEMINEÆ.

26. GELSEMIUM. Corolla equally 5-lobed. Stamens 5. Stigmas 2, two-parted.

1. VERBÁSCUM, L. MULLEIN.

Calyx 5-parted. Corolla 5-lobed, open or concave, wheel-shaped; the lobes broad and rounded, a little unequal. Stamens 5; all the filaments, or the 3 upper, woolly. Style flattened at the apex. Pod globular, many-seeded. — Tall and usually woolly biennial herbs, with alternate leaves, those of the stem sessile or decurrent. Flowers in large terminal racemes, ephemeral. (The ancient Latin name, altered from *Barbascum*.)

1. **V.** THÁPSUS, L. (COMMON MULLEIN.) *Densely woolly throughout; stem tall and stout, simple,* winged by the decurrent bases of the oblong acute leaves; *flowers* (yellow) *in a prolonged and very dense cylindrical spike;* lower stamens usually beardless. — Fields, &c.; common. (A white-flowered variety was gathered at Montrose, Penn., *Mr. Riley.*) (Nat. from Eu.)

2. **V.** BLATTÀRIA, L. (MOTH MULLEIN.) *Green and smoothish, slender;* lower leaves petioled, oblong, doubly serrate, sometimes lyre-shaped, the upper partly clasping; *raceme loose;* filaments all bearded with violet wool. — Roadsides; rather common. Corolla either yellow, or white with a tinge of purple. (Nat. from Eu.)

3. **V.** LYCHNÌTIS, L. (WHITE MULLEIN.) *Clothed with a thin powdery woolliness;* stem and branches angled above; leaves ovate, acute, not decurrent, greenish above; *flowers* (yellow, rarely white) *in a pyramidal panicle;* filaments with whitish wool. — Road-sides, Penn., rare, and sandy fields at the head of Oneida Lake, New York; — where it hybridizes freely with the common Mullein. (Adv. from Eu.)

2. LINÀRIA, Tourn. TOAD-FLAX.

Calyx 5-parted. Corolla personate, with the prominent palate often nearly closing the throat, spurred at the base on the lower side. Stamens 4. Pod thin, opening below the summit by one or two pores or chinks, toothed. Seeds many. — Herbs, with at least all the upper leaves alternate. (Name from *Linum*, the Flax, which the leaves of some species resemble.)

* *Leaves sessile, narrow.*

1. **L. Canadénsis**, Spreng. (WILD TOAD-FLAX.) *Smooth; stem slender, erect, mostly simple,* with scattered linear leaves; those from prostrate shoots oblong, crowded, and mostly opposite or whorled; *flowers blue* (very small), in a slender raceme, short-pedicelled; spur thread-shaped (occasionally wanting). ① ② — Sandy soil; common, especially southward. June – Aug.

2. L. VULGÀRIS, Mill. (TOAD-FLAX. BUTTER-AND-EGGS. RAMSTED.) *Smooth and pale,* erect (1° - 3° high); leaves alternate, crowded, linear or lanceolate, acutish; *flowers crowded in a dense raceme, yellow,* pretty large (1′ long); spur awl-shaped; *seeds flattened and margined.* ♃ — Old fields and road-sides; common eastward: a showy but pernicious weed. Aug. — The *Peloria* state, with a regular 5-cleft border to the corolla, 5 spurs, and 5 stamens, has been observed in Pennsylvania by *Dr. Darlington.* (Nat. from Eu.)

3. L. GENISTIFÒLIA, Mill. *Very smooth and glaucous,* paniculate-branched; leaves lanceolate, acute, often partly clasping; *flowers scattered, yellow* (smaller than in No. 2); *seeds angled and wrinkled.* ♃ — Road-sides, New York, near the city (*H. J. Clark, Lesquereux*). (Adv. from Eu.)

* * *Leaves petioled, broad, veiny.*

4. L. ELÁTINE, Mill. Hairy, branched, procumbent; leaves alternate, ovate and halberd-shaped, mostly shorter than the slender axillary peduncles; flowers small, yellow and purplish; sepals lanceolate, very acute. ① — Fields and banks, E. Massachusetts to Virginia; scarce. (Adv. from Eu.)

3. ANTIRRHÌNUM, L. SNAPDRAGON.

Corolla saccate at the base, the throat closed by the large bearded palate. Seeds oblong-truncate. Otherwise nearly as Linaria. Corolla commonly showy, resembling the face of an animal or a mask; whence the name (from ἀντι, *in comparison with,* and ῥιν, *a snout*).

1. A. ORÓNTIUM, L. Stem erect (6′ - 12′ high); leaves lance-linear; spikes loosely few-flowered; sepals longer than the purplish corolla. ① — Fields, Virginia, &c.; scarce. (Adv. from Eu.)

A. MÀJUS, L., is the common cultivated SNAPDRAGON.

4. SCROPHULÀRIA, Tourn. FIGWORT.

Calyx deeply 5-cleft. Corolla with a somewhat globular tube; the 4 upper lobes of the short border erect (the two upper longer), the lower spreading. Stamens 4, declined, with the anther-cells transverse and confluent into one; the vestige of the fifth stamen forms a scale-like rudiment at the summit of the tube of the corolla. Pod many-seeded. — Rank herbs, with mostly opposite leaves, and small greenish-purple or lurid flowers in loose cymes, forming a terminal narrow panicle. (So called because a reputed remedy for *scrofula*.)

1. **S. nodòsa,** L. Smooth (3°–4° high); stem 4-sided; leaves ovate, oblong, or the upper lanceolate, cut-serrate, rounded or heart-shaped at the base. ♃ (S. Marilándica, *L.*, and S. lanceolàta, *Pursh*.) — Damp copses and banks. July. (Eu.)

5. COLLÍNSIA, Nutt. COLLINSIA.

Calyx deeply 5-cleft. Corolla declined, with the tube saccate or bulging at the base on the upper side, deeply 2-lipped; the upper lip 2-cleft, its lobes partly folded backwards; the lower 3-cleft, its middle lobe keeled and sac-like, enclosing the 4 declined stamens and style. Fifth stamen a slender rudiment. Pod many-seeded. — Slender branching annuals, with opposite leaves, and handsome party-colored flowers in umbel-like clusters, appearing whorled in the axils of the upper leaves. (Dedicated to the late *Zaccheus Collins*, of Philadelphia, an accurate botanist.)

1. **C. vérna,** Nutt. Slender (6′–20′ high); leaves ovate; the lower petioled; the upper ovate-lanceolate, clasping by the heart-shaped base, toothed; *whorls about 6-flowered; flowers long-peduncled; corolla (blue and white) twice the length of the calyx.* — Rich shady places, W. New York to Wisconsin and Kentucky. May, June.

2. **C. parviflòra,** Dougl. Small; lower leaves ovate or rounded, petioled; the upper oblong-lanceolate, mostly entire; *whorls 2–6-flowered; flowers short-peduncled;* the small (blue) *corolla scarcely exceeding the calyx.* — South shore of Lake Superior (*Pitcher*); thence westward.

C. BÍCOLOR, Benth., a showy Californian species, has become common in cultivation.

6. CHELÒNE, Tourn. TURTLE-HEAD. SNAKE-HEAD.

Calyx of 5 distinct imbricated sepals. Corolla inflated-tubular, with the mouth a little open; the upper lip broad and arched, keeled in the middle, notched at the apex; the lower woolly-bearded in the throat, 3-lobed at the apex, the middle lobe smallest. Stamens 4, with woolly filaments and very woolly heart-shaped anthers; and a fifth sterile filament smaller than the others. Seeds many, wing-margined. — Smooth perennials, with upright branching stems, opposite serrate leaves, and large white or purple flowers, which are nearly sessile in spikes or clusters, and closely imbricated with round-ovate concave bracts and bractlets. (Name from χελώνη, *a tortoise*, the corolla resembling in shape the head of a reptile.)

1. **C. glàbra,** L. Leaves very short-petioled, lanceolate or lance-oblong, pointed, variable in width, &c.; the flowers white, rose-color, or purple. Also C. obliqua, *L.*, &c. — Wet places; common. July – Sept. — Called also SHELL-FLOWER, BALMONY, &c.

7. PENTSTÈMON, Mitchell. BEARD-TONGUE. PENTSTEMON.

Calyx 5-parted. Corolla tubular and more or less inflated, either decidedly or slightly 2-lipped; the upper lip 2-lobed, and the lower 3-cleft. Stamens 4, declined at the base, ascending above; and a fifth sterile filament usually as long as the others, either naked or bearded. Seeds numerous, wingless. — Perennials, branched from the base, simple above, with opposite leaves, the upper sessile and mostly clasping. Flowers showy, thyrsoid-panicled. (Name from *πέντε*, *five*, and *στήμων*, *stamen*; the fifth stamen being present and conspicuous, although sterile.)

* *Sterile filament bearded down one side: flowers in a loose panicle, somewhat clammy, white or whitish; peduncles slender.*

1. **P. pubéscens,** Solander. More or less pubescent (1°–3° high); stem-leaves lanceolate from a clasping base, serrate or sometimes entire; *corolla 2-lipped, gradually widened upwards, flattened* and one-ridged on the upper side, and with 2 infolded lines on the lower which are bearded inside; lower lip longer than the upper. — Varies greatly in the foliage, sometimes nearly glabrous, when it is P. lævigàtus, *Soland.*, &c. — Dry banks, Connecticut to Wisconsin, and southward. June – Sept.

2. **P. Digitàlis,** Nutt. Nearly glabrous (2°–4° high); stem-leaves oblong- or ovate-lanceolate, clasping, serrulate or entire; *corolla slightly 2-lipped, abruptly inflated and almost bell-shaped* from a narrow base, beardless. — Moist ground, Kentucky and southward. — Flowers larger than in the last, showy.

* * *Sterile filament nearly smooth: flowers purple, racemose.*

3. **P. grandiflòrus,** Fraser. Very smooth and glaucous; stems simple (1°–3° high); leaves thick, ovate or rounded, the upper clasping; flowers (showy, 2' long) on short pedicels, in a long and narrow raceme rather than panicle; corolla oblong-bell-shaped, almost regular. — Prairies, W. Wisconsin? (Falls of St. Anthony, *Lapham*. Dubuque, Iowa, *Dr. Hor.*)

8. MÍMULUS, L. MONKEY-FLOWER.

Calyx prismatic, 5-angled, 5-toothed, the upper tooth largest. Corolla tubular; the upper lip erect or reflexed-spreading, 2-lobed; the lower spreading, 3-lobed. Stamens 4. Stigma 2-lipped, the lips ovate. Seeds numerous. — Herbs, with opposite leaves, and mostly handsome flowers on solitary axillary peduncles. (Name from *μιμώ*, *an ape*, on account of the gaping corolla.)

* *Erect, glabrous: leaves feather-veined: corolla violet-purple.*

1. **M. ríngens,** L. Stem square (1°–2° high); *leaves oblong or lanceolate, pointed, clasping* by a heart-shaped base, serrate; peduncles longer than the flower; calyx-teeth taper-pointed. ♃ — Wet places; common. July – Sept. — Flower 1'–1½' long.

2. **M. alàtus,** Ait. Stem somewhat winged at the angles; *leaves oblong-ovate, tapering into a petiole;* peduncles shorter than the calyx, which has very short and abruptly pointed teeth: otherwise like the last. — Low grounds, Connecticut to Illinois, and southward.

* * *Diffusely spreading: leaves several-nerved and veiny: corolla yellow.*

3. **M. Jamèsii,** Torr. Smooth; stems creeping at the base; stem-leaves round or kidney-shaped, nearly sessile, equalling the peduncles; calyx ovate, inflated in fruit, the upper tooth much the largest. — In cool springs, Mackinaw, Wisconsin, and westward. — Flower small.

M. LÙTEUS, with its varieties, and M. MOSCHÀTUS, the MUSK-PLANT, from Oregon, are common in cultivation.

9. CONÒBEA, Aublet. (CAPRÀRIA, *Michx.*)

Calyx 5-parted, equal. Upper lip of the corolla 3-lobed, the lower 3-parted. Stamens 4, fertile: anthers approximate. Style 2-lobed at the apex, the lobes wedge-form. Seeds numerous. — Low branching herbs, with opposite leaves, and small solitary flowers on axillary 2-bractleted peduncles. (Name unexplained.)

1. **C. multífida,** Benth. Diffusely spreading, much branched, minutely pubescent; leaves petioled, pinnately parted, the divisions linear-wedge-shaped; corolla (greenish-white) scarcely longer than the calyx. ① — Sandy river-banks, Ohio to Illinois, and southward. July – Sept.

10. HERPÉSTIS, Gærtn. HERPESTIS.

Calyx 5-parted; the upper division broadest, the innermost frequently very narrow. Upper lip of the corolla entire, notched, or 2-cleft; the lower 3-lobed. Stamens 4, all fertile. Style dilated or 2-lobed at the apex. Seeds numerous. Low herbs with opposite leaves and solitary axillary flowers. (Name from ἑρπηστής, *a creeping thing,* the species being chiefly procumbent.)

* *Upper lip of the blue corolla merely notched: leaves many-nerved.*

1. **H. rotundifòlia,** Pursh. Nearly smooth, creeping; *leaves round-obovate, half clasping* (½′ – 1′ long); *peduncles twice or thrice the length of the calyx,* the upper sepal ovate. ♃ — Wet places, Illinois and southward. Aug.

2. **H. amplexicaùlis,** Pursh. Stems hairy, creeping at the base; *leaves ovate, clasping; peduncles shorter than the calyx;* upper sepal heart-shaped. ♃ — Wet places, New Jersey and southward. Aug. — Aromatic when bruised.

* * *Corolla* (*bluish*) *almost equally* 5-*cleft, the upper lip being* 2-*parted: stamens almost equal: leaves nearly nerveless.*

3. **H. Monnièra,** H. B. K. Smooth, somewhat creeping; leaves obovate or wedge-shaped; peduncles rather long, 2-bracted at the apex. ♃ — River-banks, Maryland and southward along the coast.

11. GRATÌOLA, L. HEDGE-HYSSOP.

Calyx 5-parted, the divisions narrow and nearly equal. Upper lip of the corolla entire or 2-cleft, the lower 3-cleft. Fertile stamens 2, included, posterior; the anterior mere sterile filaments, or wanting. Style dilated or 2-lipped at the apex. Pod 4-valved, many-seeded. — Low herbs, mostly perennial, with opposite sessile leaves, and axillary 1-flowered peduncles, usually with 2 bractlets at the base of the calyx. (Name from *gratia,* grace or favor, on account of its supposed excellent medicinal properties.)

§ 1. *Anthers with a broad connective: the cells transverse: stems mostly diffusely branched, soft viscid-pubescent or smooth.*

* *Sterile filaments minute or none: corolla whitish, with the tube yellowish.*

1. **G. Virginiàna,** L. Stem rather clammy-pubescent above, loosely branched (4′–6′ high); leaves lanceolate, narrowed at the base, sparingly toothed; *peduncles almost equalling the leaves* (½′–1′ long); pod ovoid (2″ long). — Wet places; very common. June–Aug.

2. **G. sphærocárpa,** Ell. Smooth, rather stout (5′–10′ high); leaves lance-ovate or oblong, toothed, *peduncles scarcely longer than the calyx* and the large (3″) globular pod. — Wet places, Virginia? Kentucky, and southward.

* *Sterile filaments slender, tipped with a little head: leaves short (½′–1′ long).*

3. **G. viscòsa,** Schweinitz. *Clammy-pubescent or glandular; leaves ovate-lanceolate or oblong,* acute, toothed, mostly shorter than the peduncles; *corolla whitish, yellow within.* — Wet places, Kentucky and southward. July. — Stems 4′–10′ high from a rooting base, as in the next.

4. **G. aùrea,** Muhl. *Nearly glabrous; leaves lanceolate or oblong-linear, entire,* equalling the peduncles; *corolla golden yellow* (½′ long). — Sandy swamps, Vermont? and Mass. to Virginia, near the coast, and southward. June–Sept.

§ 2. *Anthers with no broad connective; the cells vertical: hairy plants, with erect rigid stems: sterile filaments tipped with a bead.*

5. **G. pilòsa,** Michx. Leaves ovate or oblong, sparingly toothed, sessile (½′–¾′ long); flowers nearly sessile; corolla white, scarcely exceeding the calyx – Low ground, Maryland and southward.

12. ILYSÁNTHES, Raf. (LINDÉRNIA, *Muhl.*)

Calyx 5-parted, nearly equal. Upper lip of the corolla short, erect, 2-lobed; the lower larger and spreading, 3-cleft. Fertile stamens 2, included, posterior; the anterior pair sterile, inserted in the throat of the corolla, 2-lobed, without anthers; one of the lobes glandular; the other smooth, usually short and tooth-like. Style 2-lipped at the apex. Pod ovate or oblong, many-seeded. — Small smooth herbs, with opposite leaves, and small axillary (purplish) flowers, or the upper racemed. (Name from ἰλύς, *mud* or *mire*, and ἄνθος, *flower.*)

1. **I. gratioloìdes,** Benth. (FALSE PIMPERNEL.) Much branched, diffusely spreading (4′–8′ high); leaves ovate, rounded, or oblong, sparingly toothed or entire, the upper partly clasping; pod ovoid-oblong. ① (Caprària gratioloides, *L.* Lindernia dilatàta, & L. attenuàta, *Muhl.*) — Low grounds, and along rivulets; common. June–Sept.

13. HEMIÁNTHUS, Nutt. HEMIANTHUS.

Calyx 4-toothed, equal. Corolla 2-lipped; the upper lip very short, entire; the lower 3-lobed, with the middle lobe elongated and spreading. Stamens 2, anterior, with a scale at the base of the filaments: sterile filaments none. Style short. Pod globular, membranaceous, the thin partition vanishing. Seeds rather numerous. — A very small and inconspicuous annual, creeping and rooting on the wet muddy banks of rivers, with crowded opposite round leaves, and minute solitary flowers sessile in their axils. (Name from ἥμι, *half*, and ἄνθος, *flower*, in reference to the unequally divided corolla.)

1. **H. micranthemoìdes,** Nutt. — Low banks of the Delaware below Philadelphia. (Perhaps only Micranthemum.)

14. LIMOSÉLLA, L. MUDWORT.

Calyx bell-shaped, 5-toothed. Corolla short, widely bell-shaped, 5-cleft, nearly regular. Stamens 4: anthers confluently 1-celled. Style short, club-shaped. Pod globular, many-seeded; the partition thin and vanishing. — Small annuals, growing in mud, usually near the sea-shore, creeping by slender runners, without ascending stems; the entire fleshy leaves in dense clusters around the simple 1-flowered peduncles. Flowers small, white or purplish. (Name a diminutive of *limus*, mud, in which these little plants delight to grow.)

1. **L. aquática,** L.: var. **tenuifòlia,** Hoffm. Leaves (with no blade distinct from the petiole) awl-shaped or thread-form. (L. tenuifolia, *Nutt.* L. subulata, *Ives.*) — In brackish mud, from New Jersey northward. Aug. — Plant 1′-2′ high. (Eu.)

15. SÝNTHYRIS, Benth. SYNTHÝRIS.

Calyx 4-parted. Corolla somewhat bell-shaped, variously 2-4-lobed or cleft. Stamens 2, inserted just below the sinuses on each side of the upper lobe of the corolla, occasionally with another pair from the other sinuses, exserted: anther-cells not confluent into one. Style slender: stigma simple. Pod flattened, rounded, obtuse or notched, 2-grooved, 2-celled (rarely 3-lobed and 3-celled), many-seeded, loculicidal; the valves cohering below with the columella. — Perennial herbs, with the simple scape-like stems beset with partly-clasping bract-like alternate leaves, the root-leaves rounded and petioled, crenate. Flowers in a raceme or spike, with bracted pedicels. (Name composed of σύν, *together*, and θυρίς, *a little door*; evidently in allusion to the closed valves of the pod.)

1. **S. Houghtoniàna,** Benth. Hairy; root-leaves round-ovate, heart-shaped; raceme spiked, dense (5′-12′); corolla not longer than the calyx, usually 2-3-parted. — High prairies and hills, Wisconsin, *Houghton, Lapham.* Michigan, *Wright.* Illinois, *Mead.* May. — Corolla greenish-white, for the most part deeply 2-parted, with the upper lip entire, a little longer and narrower than the lower, which is 3-toothed; often 3-parted, with the upper lip notched or 2-lobed. When there are 4 stamens the lower are later than the others.

16. VERÓNICA, L. SPEEDWELL.

Calyx 4-parted. Corolla wheel-shaped or salver-shaped, the border 4-parted (rarely 5-parted); the lateral lobes or the lower one commonly narrower than the others. Stamens 2, one each side of the upper lobe of the corolla, exserted: anther-cells confluent at the apex. Style entire: stigma single. Pod flattened, usually obtuse or notched at the apex, 2-celled, few-many-seeded. — Chiefly herbs, with the leaves mostly opposite or whorled; the flowers blue, flesh-color, or white. (Name of doubtful derivation; perhaps the flower of *St. Veronica.*)

§ 1. *Tall perennials, with mostly whorled leaves: racemes terminal, dense, spiked: bracts very small: tube of the corolla longer than its limb and much longer than the calyx.* (Leptándra, *Nutt.*)

1. **V. Virgínica,** L. (Culver's-root. Culver's Physic.) Smooth or rather downy; stem simple, straight (2° - 6° high); leaves whorled in fours to sevens, short-petioled, lanceolate, pointed, finely serrate; spikes panicled; stamens much exserted. — Rich woods, Vermont to Wisconsin, and southward: often cultivated. July. — Corolla small, nearly white. Pod oblong-ovate, not notched, opening by 4 teeth at the apex, many-seeded.

§ 2. *Perennials with opposite usually serrate leaves: flowers in axillary opposite racemes: corolla wheel-shaped (pale blue): pod rounded, notched, rather many-seeded.*

2. **V. Anagállis,** L. (Water Speedwell.) Smooth, creeping and rooting at the base, then erect; *leaves sessile, most of them clasping by a heart-shaped base, ovate-lanceolate,* acute, serrate or entire (2′ - 3 long); pedicels spreading; pod slightly notched. — Brooks and ditches, especially northward; not so common as the next. June - Aug. — Corolla pale blue with purple stripes. (Eu.)

3. **V. Americàna,** Schweinitz. (American Brooklime.) Smooth, decumbent at the base, then erect (8′ - 15′ high); *leaves mostly petioled, ovate or oblong,* acutish, serrate, thickish, truncate or slightly heart-shaped at the base; the slender pedicels spreading; pod turgid. (V. Beccabúnga, *Amer. authors.*) — Brooks and ditches; common northward. June - Aug. — Flowers as in the last; the leaves shorter and broader.

§ 3. *Perennials, with diffuse or ascending branches from a decumbent base: leaves opposite: racemes axillary, from alternate axils: corolla wheel-shaped: pod strongly flattened, several-seeded.*

4. **V. scutellàta,** L. (Marsh Speedwell.) *Smooth,* slender and weak (6′ - 12′ high); *leaves sessile, linear, acute, remotely denticulate; racemes* 1 *or* 2, *very slender* and zigzag; *flowers few and scattered,* on elongated spreading or reflexed pedicels; pod very flat, much broader than long, notched at both ends. — Bogs; common northward. June - Aug. (Eu.)

5. **V. officinàlis,** L. (Common Speedwell.) *Pubescent;* stem *prostrate,* rooting at the base; *leaves short-petioled, obovate-elliptical or wedge-oblong, obtuse, serrate; racemes densely many-flowered;* pedicels shorter than the calyx; pod obovate-triangular, broadly notched. — Dry hills and open woods; certainly indigenous in many places, especially in the Alleghanies. July. (Eu.)

§ 4. *Leaves opposite: flowers in a terminal raceme, the lower bracts resembling the stem-leaves: corolla wheel-shaped: pods flat, several-seeded.*

* *Perennials (mostly turning blackish in drying).*

6. **V. alpìna,** L. (Alpine Speedwell.) Stem branched from the base, erect, simple (2′ - 6′ high); *leaves elliptical,* or the lowest rounded, entire or toothed, *nearly sessile; raceme hairy, few-flowered, crowded;* pod obovate, notched. — Alpine summits of the White Mountains, New Hampshire. (Eu.)

7. **V. serpyllifòlia,** L. (THYME-LEAVED SPEEDWELL. PAUL'S BETONY.) Much branched at the creeping base, *nearly smooth;* branches ascending and simple (2′–4′ high); *leaves ovate or oblong*, obscurely crenate, *the lowest petioled* and rounded, the upper passing into lanceolate bracts; *raceme loose;* pod rounded, broader than long, obtusely notched.—Road-sides and fields; common: introduced and indigenous. May–July.—Corolla whitish, or pale blue, with deeper stripes. (Eu.)

* * *Annuals: floral leaves like those of the stem, so that the flowers appear axillary and solitary: corolla shorter than the calyx.*

8. **V. peregrìna,** L. (NECKWEED. PURSLANE SPEEDWELL.) *Nearly smooth*, erect (4′–9′ high). branched; *lowest leaves petioled, oval-oblong, toothed,* thickish; the others sessile, obtuse; the upper oblong-linear and entire, longer than the almost sessile (whitish) flowers; *pod orbicular, slightly notched,* many-seeded.—Waste and cultivated grounds; common: appearing like an introduced weed. April–June.

9. **V.** ARVÉNSIS, L. (CORN SPEEDWELL.) Simple or diffusely branched (3′–8′ high), *hairy; lower leaves petioled, ovate, crenate;* the uppermost sessile, lanceolate, entire; peduncles shorter than the calyx; *pod inversely heart-shaped,* the lobes rounded.—Cultivated grounds; rather common. (Nat. from Eu.)

§ 5. *Annuals (prostrate-spreading, hairy): stem-leaves opposite (all petioled), the upper alternate and bearing solitary peduncled flowers in their axils: corolla wheel-shaped: pod flat: seeds cup-shaped.*

10. **V.** AGRÉSTIS, L. (FIELD SPEEDWELL.) Leaves round or ovate, crenate-toothed; the floral somewhat similar, *about the length of the recurved peduncles;* calyx-lobes oblong; flower small; *ovary many-ovuled,* but the *nearly orbicular sharply notched pod* 12–20-seeded.—Sandy fields; rare. (Adv. from Eu.)

11. **V.** BUXBAÙMII, Tenore. *Leaves* round or heart-ovate, crenately cut-toothed (¾′–1′ long), *shorter than the peduncles;* flower large (nearly ½′ wide, blue); calyx-lobes lanceolate, widely spreading in fruit; *pod obcordate-triangular, broadly notched,* 16–24-seeded.—Waste grounds, Philadelphia: rare. Milton, Massachusetts, *D. Murray*. (Adv. from Eu.)

12. **V.** HEDERÆFÒLIA, L. (IVY-LEAVED SPEEDWELL.) *Leaves* rounded or heart-shaped, 3–7-*toothed or lobed, shorter than the peduncles;* calyx-lobes somewhat heart-shaped; flowers small; *pod turgid, 2-lobed,* 2–4-*seeded.*—Shaded places, Long Island to Pennsylvania; scarce. April–June. (Adv. from Eu.)

17. BUCHNÈRA, L. BLUE-HEARTS.

Calyx tubular, obscurely nerved, 5-toothed. Corolla salver-form, with a straight or curved tube, and an almost equally 5-cleft limb: the lobes oblong or wedge-obovate, flat. Stamens 4, included, approximate in pairs: anthers one-celled (the other cell wanting). Style club-shaped and entire at the apex. Pod 2-valved, many-seeded.—Perennial rough-hairy herbs (doubtless root-parasites), turning blackish in drying, with opposite leaves, or the uppermost alternate; the flowers opposite in a terminal spike, bracted and with 2 bractlets. (Named in honor of *J. G. Buchner*, an early German botanist.)

1. **B. Americàna,** L. Rough-hairy; stem wand-like (1°-2° high); lower leaves obovate-oblong, obtuse, the others oblong and lanceolate, sparingly and coarsely toothed, veiny; the uppermost linear-lanceolate, entire; spike interrupted; calyx longer than the bracts, one third the length of the deep-purple pubescent corolla. — Moist places, W. New York to Virginia, Kentucky, and southward. June-Aug.

18. SEYMÈRIA, Pursh. SEYMERIA.

Calyx bell-shaped, deeply 5-cleft. Corolla with a short and broad tube, not longer than the 5 ovate or oblong nearly equal and spreading lobes. Stamens 4, somewhat equal: anthers approximate by pairs, oblong, 2-celled; the cells equal and pointless. Pod many-seeded. — Erect branching herbs, with the leaves mostly opposite and dissected or pinnatifid, the uppermost alternate and bract-like. Flowers yellow, interruptedly racemed or spiked. (Named by Pursh after *Henry Seymer*, an English naturalist.)

1. **S. macrophýlla,** Nutt. (MULLEIN-FOXGLOVE.) Rather pubescent (4°-5° high); leaves large, the lower pinnately divided, with the broadly lanceolate divisions pinnatifid and incised; the upper lanceolate; tube of the corolla incurved, very woolly inside, as are the filaments except their apex; style short, dilated and notched at the point; pod ovate, pointed. — Shady river-banks, Ohio, Kentucky, and southwestward. July.

19. GERÁRDIA, L. GERARDIA.

Calyx bell-shaped, 5-toothed or 5-cleft. Corolla bell-shaped-funnel-form, or somewhat tubular, swelling above, with 5 more or less unequal spreading lobes, the 2 upper usually rather smaller and more united. Stamens 4, strongly didynamous, included, hairy: anthers approaching by pairs, 2-celled; the cells parallel, often pointed at the base. Style elongated, mostly enlarged and flattened at the apex. Pod ovate, pointed, many-seeded. — Erect branching herbs (clandestine root-parasites), with the stem-leaves opposite, or the upper alternate, the uppermost reduced to bracts and subtending 1-flowered peduncles, which often form a raceme or spike. Flowers showy, purple or yellow. (Dedicated to the celebrated herbalist, *Gerard*.)

§ 1. GERARDIA PROPER. — *Calyx-teeth short: corolla purple or rose-color: anthers all alike, nearly pointless: leaves linear, entire.* (*Our species are all branching annuals.*)

* *Peduncles shorter* (*or in No. 3 only twice longer*) *than the calyx: stem erect.*

1. **G. purpùrea,** L. (PURPLE GERARDIA.) Stem (8′-20′ high) with long and rigid widely spreading branches; *leaves linear, acute, rough-margined;* flowers large (1′ long), bright purple, often downy); *calyx-teeth sharp-pointed,* shorter than the tube. — Low grounds; most common eastward and near the coast. July, Aug.

2. **G. marítima,** Raf. (SEA-SIDE GERARDIA.) Low (4′-12′ high), with shorter branches; *leaves rather fleshy and obtuse, as are the short calyx-teeth,* corolla ½′ long. — Salt marshes along the coast. Aug.

3. **G. áspera,** Dougl. Sparingly branched (1° - 2° high); leaves long and narrowly linear, rough; *pedicels once or twice the length of the calyx,* which has *lanceolate acute teeth as long as the tube;* corolla larger than in No. 1, glabrous. — Damp grounds, Illinois and northwestward. Aug.

* * *Peduncles long and filiform, commonly exceeding the leaves: stems diffusely branched, slender* (8′ - 20′ *high*): *corolla light purple,* 5″ - 7″ *long.*

4. **G. tenuifòlia,** Vahl. (SLENDER GERARDIA.) *Leaves narrowly linear,* acute, the floral ones mostly like the others; *calyx-teeth very short, acute; pod globular, not exceeding the calyx.* — Dry woods; common. Aug.

5. **G. setàcea,** Walt. *Leaves bristle-shaped,* as are the branchlets, or the lower linear; *pod ovate, mostly longer than the calyx,* which has short setaceous teeth. (G. Skinneriana, *Wood.*) — Dry grounds, Pennsylvania to Wisconsin, and southward. Aug.

§ 2. DASÝSTOMA, Raf. — *Calyx 5-cleft, the lobes often toothed: corolla yellow; the tube elongated, woolly inside, as well as the anthers and filaments: anthers all alike, scarcely included, the cells awn-pointed at the base: leaves rather large, all of them or the lower pinnatifid or toothed.* (*Perennial.*)

6. **G. flàva,** L. partly. (DOWNY FALSE FOXGLOVE.) *Pubescent with a fine close down;* stem (3° - 4° high) mostly simple; *leaves ovate-lanceolate or oblong, obtuse, entire, or the lower usually sinuate-toothed or pinnatifid; peduncles very short;* calyx-lobes oblong, obtuse, rather shorter than the tube. — Open woods; common, especially in the Middle States. Aug. — Corolla 1½′ long.

7. **G. quercifòlia,** Pursh. (SMOOTH FALSE FOXGLOVE.) *Smooth and glaucous* (3° - 6° high), usually branching; lower *leaves twice-pinnatifid; the upper oblong-lanceolate, pinnatifid or entire; peduncles nearly as long as the calyx,* the lance-linear acute lobes of which are as long as the at length inflated tube. — Rich woods; common, especially southward. Aug. — Corolla 2′ long.

8. **G. integrifòlia.** *Smooth, not glaucous;* stem (1° - 2° high) mostly simple; *leaves lanceolate, acute, entire,* or the lowest obscurely toothed; *peduncles shorter than the calyx.* (Dasystoma quercifolia, var.? integrifolia, *Benth.*) — Woods and barrens, Ohio to Illinois, and southward along the mountains. Aug. — Corolla 1′ long.

9. **G. pediculària,** L. Smoothish or pubescent, much branched (2° - 3° high, very leafy); *leaves ovate-lanceolate, pinnatifid, the lobes cut and toothed; pedicels longer than the hairy calyx.* — Dry copses; common. Aug. — Corolla 1′ or more in length.

§ 3. OTOPHÝLLA, Benth. — *Calyx deeply 5-cleft, the lobes unequal: corolla purple (rarely white), sparingly hairy inside, as well as the very unequal stamens: anthers pointless, those of the shorter pair much smaller than the others.* (*Annual?*)

10. **G. auriculàta,** Michx. Rough-hairy; stem erect, nearly simple (9′ - 20′ high); leaves lanceolate or ovate-lanceolate, sessile; the lower entire; the others with an oblong-lanceolate lobe on each side at the base; flowers nearly sessile in the axils. — Low grounds, Penn. to Michigan, Illinois, and southward. Aug. — Corolla nearly 1′ long.

20. CASTILLÈIA, Mutis. PAINTED-CUP.

Calyx tubular, flattened, cleft at the summit on the anterior, and usually on the posterior side also; the divisions entire or 2-lobed. Tube of the corolla included in the calyx; upper lip long and narrow, arched and keeled, flattened laterally, enclosing the 4 unequal stamens; the lower short, 3-lobed. Anther-cells oblong-linear, unequal, the outer fixed by the middle, the inner pendulous. Pod many-seeded. — Herbs (parasitic on roots), with alternate entire or cut-lobed leaves; the floral ones dilated, colored, and usually more showy than the pale yellow or purplish spiked flowers. (Dedicated to *Castillejo*, a Spanish botanist.)

1. **C. coccinea,** Spreng. (SCARLET PAINTED-CUP.) Hairy; stem simple; root-leaves clustered; those of the stem lanceolate, mostly incised; the floral 3-cleft, *bright scarlet* towards the summit; *calyx almost equally 2-cleft, the lobes nearly entire,* about the length of the greenish-yellow corolla. ① ② (Euchròma coccinea, *Nutt.*) — Low grounds; not uncommon. May – July. — A variety is occasionally found with the bracts dull yellow instead of scarlet.

2. **C. septentrionàlis,** Lindl. (MOUNTAIN PAINTED-CUP.) Smooth or sparingly hairy; leaves lanceolate, often incised; the floral oblong or obovate, incised or toothed, *whitish,* rarely tinged with purple; *calyx cleft more deeply in front, the divisions 2-cleft,* the ovate-oblong lobes mostly shorter than the whitish corolla; *lower lip of the corolla very short.* ♃ (Bártsia pállida, *Bigel.*) — Alpine region of the White Mountains, New Hampshire, and Green Mountains, Vermont; also northward. August. (Eu.)

3. **C. sessiliflòra,** Pursh. Hairy, low (6′ – 9′ high); leaves mostly 3-cleft, with narrow diverging lobes; the floral broader and *scarcely colored:* spike many-flowered, crowded; *calyx deeper cleft in front, the divisions 2-cleft,* shorter than the tube of the long and narrow greenish-yellow corolla; which has the *lobes of the lower lip slender,* pointed, half the length of the upper. — Prairies, Wisconsin (*Lapham*) and westward. — Corolla 2′ long.

21. SCHWÁLBEA, Gronov. CHAFF-SEED.

Calyx oblique, tubular, 10 – 12-ribbed, 5-toothed: the posterior tooth much smallest, the 2 anterior united much higher than the others. Upper lip of the corolla arched, oblong, entire; the lower rather shorter, erect, 2-plaited, with 3 very short and broad obtuse lobes. Stamens 4, included in the upper lip: anther-cells equal and parallel, obscurely pointed at the base. Pod ovate, many-seeded. Seeds linear, with a loose chaff-like coat. — A perennial minutely pubescent upright herb, with leafy simple stems, terminated by a loose spike of rather large dull purplish-yellow flowers; the leaves alternate, sessile, 3-nerved, entire, ovate or oblong, the upper gradually reduced into narrow bracts. Pedicels very short, with 2 bractlets under the calyx. (Dedicated to *C. G. Schwalbe,* an obscure Dutch botanist.)

1. **S. Americàna,** L. — Wet sandy soil, from Sandwich, Massachusetts, and New Jersey, southward, near the coast: rare. May – July. — Plant 1° – 2° high.

22. EUPHRÀSIA, Tourn. EYEBRIGHT.

Calyx tubular or bell-shaped, 4-cleft. Upper lip of the corolla scarcely arched, 2-lobed, the lobes broad and spreading; lower lip spreading, 3-cleft, the lobes obtuse or notched. Stamens 4, under the upper lip: anther-cells equal, pointed at the base. Pod oblong, flattened. Seeds numerous. — Herbs with branching stems, and opposite toothed or cut leaves. Flowers small, spiked. (Name εὐφρασία, *cheerfulness*, in allusion to its reputed medicinal properties.)

1. **E. officinàlis,** L. Low; leaves ovate, oblong, or lanceolate, the lowest crenate, the floral bristly-toothed; lobes of the lower lip of the (whitish, yellowish, or bluish) corolla notched. ① — Alpine summits of the White Mountains, New Hampshire (*Oakes*), L. Superior, and northward. A dwarf variety, 1′-5′ high, with very small flowers. (E. pusilla, *Godet, mss.*) (Eu.)

23. RHINÁNTHUS, L. YELLOW-RATTLE.

Calyx membranaceous, flattened, much inflated in fruit, 4-toothed. Upper lip of the corolla arched, ovate, obtuse, flattened, entire at the summit, but furnished with a minute tooth on each side below the apex; lower lip 3-lobed. Stamens 4, under the upper lip: anthers approximate, hairy, transverse; the cells equal, pointless. Pod orbicular, flattened. Seeds many, orbicular, winged. — Annual upright herbs, with opposite leaves; the lower oblong or linear; the upper lanceolate, toothed; the floral rounded and cut-serrate with bristly teeth; the solitary yellow flowers nearly sessile in their axils, and crowded in a one-sided spike. (Name composed of ῥίν, *a snout*, and ἄνθος, *a flower*, from the beaked upper lip of the corolla in some species formerly of this genus.)

1. **R. Crista-gálli,** L. (COMMON YELLOW-RATTLE.) Leaves oblong or lanceolate; seeds broadly winged (when ripe they rattle in the large inflated calyx, whence the English popular name). — Moist meadows, Plymouth, Mass. (introduced?), White Mountains, N. Hampshire, and northward. (Eu.)

24. PEDICULÀRIS, Tourn. LOUSEWORT.

Calyx tubular or bell-shaped, variously 2-5-toothed, and more or less cleft in front. Corolla strongly 2-lipped; the upper lip arched, flattened, often beaked at the apex; the lower erect at the base, 2-crested above, 3-lobed; the lobes commonly spreading, the lateral ones rounded and larger. Stamens 4, under the upper lip: anthers transverse; the cells equal, pointless. Pod ovate or lanceolate, mostly oblique, several-seeded. — Perennial herbs, with chiefly pinnatifid leaves, the floral bract-like, and rather large flowers in a spike. (Name from *pediculus*, a louse; of no obvious application.)

1. **P. Canadénsis,** L. (COMMON LOUSEWORT. WOOD BETONY.) Hairy; stems simple, clustered (5′-12′ high); *leaves scattered; the lowest pinnately parted; the others half-pinnatifid;* spike short and dense; calyx split in front, otherwise almost entire, oblique; upper lip of the (dull greenish-yellow and purplish) corolla hooded, incurved, 2-toothed under the apex; *pod flat, somewhat sword-shaped.* — Copses and banks; common. May-July.

2. **P. lanceolàta,** Michx. Stem upright (1° - 3° high), nearly simple, mostly smooth; *leaves partly opposite, oblong-lanceolate, doubly cut-toothed;* spike crowded; calyx 2-lobed, leafy-crested; upper lip of the (pale yellow) corolla incurved, and bearing a short truncate beak at the apex; the lower erect, so as nearly to close the throat; *pod ovate, scarcely longer than the calyx.* (P. pállida, *Pursh.*) — Swamps, Connecticut to Virginia and Wisconsin. Aug., Sept.

25. MELAMPỲRUM, Tourn. COW-WHEAT.

Calyx bell-shaped, 4-cleft; the taper lobes sharp-pointed. Tube of the corolla cylindrical, enlarging above; upper lip arched, compressed, straight in front; the lower erect-spreading, biconvex, 3-lobed at the apex. Stamens 4, under the upper lip: anthers approximate, oblong, nearly vertical, hairy; the equal cells minutely pointed at the base. Ovary with 2 ovules in each cell. Pod flattened, oblique, 1 - 4-seeded. — Erect branching annuals, with opposite leaves, the lower entire, the upper mostly larger and fringed with bristly teeth at the base. Flowers scattered and solitary in the axils of the upper leaves in our species. (Name composed of μέλας, *black*, and πυρός, *wheat;* from the color of the seeds of field species in Europe, as they appear mixed with grain.)

1. **M. Americànum,** Michx. Leaves lanceolate, short-petioled, the lower entire; the floral ones similar, or abrupt at the base and beset with a few bristly teeth; calyx-teeth linear-awl-shaped, not half the length of the slender tube of the pale greenish-yellow corolla. (M. pratense, var. Americanum, *Benth.*) — Open woods; common. Aug. — Plant 6′ - 12′ high. Corolla 4″ - 5″ long, more slender than in M. pratense, sometimes tinged with purple.

26? GELSÉMIUM, Juss. YELLOW (FALSE) JESSAMINE.

Calyx 5-parted. Corolla open-funnel-form, 5-lobed, somewhat oblique; the lobes almost equal, the posterior outermost in the bud. Stamens 5, with oblong sagittate anthers. Style long and slender. Stigmas 2, each 2-parted; the divisions linear. Pod elliptical, flattened contrary to the narrow partition, 2-celled, septicidally 2-valved, the valves keeled: cells each ripening 5 or 6 large flat and winged seeds. Embryo straight in fleshy albumen; the ovate flat cotyledons much shorter than the slender radicle. — A smooth and twining shrubby plant, with opposite and entire ovate or lanceolate shining nearly persistent leaves, on very short petioles, and large and showy very fragrant yellow flowers, 1 - 5 together in the axils. (*Gelsemino*, the Italian name of the Jessamine.)

1. **G. sempérvirens,** Ait. (G. nitidum, *Michx.*) — Rich moist soil along the coast, Virginia and southward. March.

ORDER 75. ACANTHÀCEÆ. (ACANTHUS FAMILY.)

Chiefly herbs, with opposite simple leaves, didynamous or diandrous stamens, inserted on the tube of the more or less 2-lipped corolla, the lobes of which are convolute in the bud; fruit a 2-celled, 4 - 12-seeded pod; seeds anatropous, without albumen, usually flat, supported by hooked projections of the *placentæ.* — Flowers much bracted. Calyx 5-cleft. Style thread-form: stigma simple or 2-cleft. Pod loculicidal, usually flattened contrary to the valves and partition. Cotyledons broad and flat. — Mucilaginous and slightly bitter, not noxious. A large family in the tropics, represented in the Northern States only by two genera.

1. DIANTHÈRA, Gronov. WATER-WILLOW.

Calyx 5-parted. Corolla deeply 2-lipped; the upper lip erect, notched; the lower spreading, 3-parted. Stamens 2: anthers 2-celled, the cells placed one lower down than the other. Pod obovate, flattened, contracted at the base into a short stalk, 4-seeded. — Perennial herbs, growing in water, with narrow and entire leaves, and purplish flowers in axillary peduncled spikes or heads. (Name from δίς, *double*, and ἀνθηρά, *anther;* the separated cells giving the appearance of two anthers on each filament.)

1. **D. Americàna,** L. Leaves linear-lanceolate, elongated; spikes oblong, dense, long-peduncled. (Justicia pedunculòsa, *Michx.*) — Borders of streams and ponds, N. W. Vermont to Wisconsin, Virginia, and southward. July – Sept.

2. DIPTERACÁNTHUS, Nees. (RUÉLLIA partly, *L.*)

Calyx deeply 5-cleft. Corolla funnel-form, the spreading ample limb almost equally and regularly 5-cleft. Stamens 4, included, didynamous: cells of the somewhat arrow-shaped anthers parallel and nearly equal. Pod somewhat flattened, and stalked at the base, 8 – 12-seeded. Seeds with a mucilaginous coating. — Perennial herbs, not aquatic, with ovate or elliptical nearly entire leaves, and large and showy blue or purple flowers, solitary, few, or clustered in the axils, with a pair of leafy bracts (whence the name, from δίπτερος, *two-winged,* and ἄκανθος, the *Acanthus*).

1. **D. ciliòsus,** Nees. *Hirsute* with soft whitish hairs (1° – 3° high); *leaves nearly sessile, oval* or ovate-oblong (1¼′ – 2′ long); flowers 1 – 3 and almost sessile in the axils; *tube of the corolla* (1′ – 1½′ long) fully *twice the length* of the *setaceous calyx-lobes;* the throat short. (Ruellia ciliosa, *Pursh*. R. hýbridus, *Pursh.*, is only a Southern variety of this.) — Dry soil, Michigan to Illinois, and southward. June – Sept.

2. **D. strèpens,** Nees. *Glabrous or sparingly pubescent* (1° – 4° high); *leaves narrowed at the base into a petiole,* ovate, obovate, or mostly oblong (2½′ – 5′ long); *tube of the corolla* (about 1′ long) little longer than the dilated portion, *slightly exceeding the lanceolate or linear calyx-lobes.* — Flowers 1 – 5 in each axil, rarely on a slender peduncle, usually almost sessile; sometimes many and closely crowded, and mostly fruiting in the bud, the corolla small and not expanding (when it is D. micránthus, *Engelm. & Gr.*). — Rich soil, Pennsylvania to Wisconsin, and southward. July – Sept.

DICLÍPTERA BRACHIÀTA, Spreng. (Justicia brachiata, *Pursh*), probably grows in the southern part of Virginia.

ORDER 76. VERBENÀCEÆ. (VERVAIN FAMILY.)

Herbs or shrubs, with opposite leaves, more or less 2-lipped or irregular corolla, and didynamous stamens, the 2–4-celled fruit dry or drupaceous, usually splitting when ripe into as many 1-seeded indehiscent nutlets; differing from the following order in the ovary not being 4-lobed, the style therefore terminal, and the plants seldom aromatic or furnishing a volatile oil. — Seeds with little or no albumen; the radicle of the straight embryo pointing to the base of the fruit. — Mostly tropical or nearly so; represented here only by some Vervains, a *Lippia*, and a *Callicarpa;* to which we may still append *Phryma*, which has been promoted into an order (of a single species), because its ovary and fruit are 1-celled and 1-seeded, and the radicle points to the apex of the fruit.

1. VERBÈNA, L. VERVAIN.

Calyx tubular, 5-toothed, one of the teeth often shorter than the others. Corolla tubular, often curved, salver-form; the border somewhat unequally 5-cleft. Stamens included; the upper pair occasionally without anthers. Style slender: stigma capitate. Fruit splitting into 4 seed-like nutlets. — Flowers sessile, in single or often panicled spikes, bracted. (The Latin name for any sacred herb: derivation obscure.) — The species present numerous spontaneous hybrids.

§ 1. *Anthers not appendaged: erect herbs, with slender spikes.*

* *Leaves undivided: root perennial.*

1. **V. angustifòlia,** Michx. Low (6′–18′ high), often simple; leaves narrowly lanceolate, tapering to the base, sessile, roughish, slightly toothed; spikes few or single; the purple flowers crowded, larger than in the next. — Dry soil, Penn. to Wisconsin and southward. July–Sept.

2. **V. hastàta,** L. (BLUE VERVAIN.) Tall (4′–6′ high); *leaves lanceolate or oblong-lanceolate,* taper-pointed, cut-serrate, *petioled, the lower often lobed and sometimes halberd-shaped* at the base; *spikes linear, erect, densely flowered,* corymbed or panicled. (V. paniculàta, *Lam.*, when the leaves are not lobed.) — Low and waste grounds, common. July–Sept. (Nat. from Eu.)

3. **V. urticifòlia,** L. (NETTLE-LEAVED or WHITE VERVAIN.) Rather tall; *leaves oval or oblong-ovate, acute, coarsely serrate, petioled; spikes very slender, at length much elongated, with the flowers remote,* loosely panicled, very small, white. — Old fields and road-sides. (Nat. from Eu.)

4. **V. stricta,** Vent. (HOARY VERVAIN.) *Downy with soft whitish hairs;* stem nearly simple (1°–2° high); *leaves sessile, obovate or oblong, serrate; spikes thick and very densely flowered,* somewhat clustered, hairy. — Barrens, Ohio to Wisconsin, and southward. Aug. — Flowers blue, pretty large.

* * *Leaves cleft or pinnatifid, narrowed at the base: root perennial?*

5. **V. officinàlis,** L. (COMMON VERVAIN.) *Erect,* loosely branched (1°–3° high); *leaves pinnatifid or 3-cleft, oblong-lanceolate,* sessile, smooth above, the lobes cut and toothed; spikes panicled, very slender; *bracts small,* much

shorter than the very small purplish flowers. (V. spùria, *L.*) — Road-sides; scarce. (Nat. from Eu.)

6. **V. bracteòsa,** Michx. *Widely spreading or procumbent*, hairy; *leaves wedge-lanceolate, cut-pinnatifid or 3-cleft*, short-petioled; spikes single, remotely flowered; *bracts large and leafy*, the lower pinnatifid, longer than the small purple flowers. — River-banks, Wisconsin to Kentucky. Aug.

§ 2. *Anthers of the longer stamens tipped with a glandular appendage.*

7. **V. Aublètia,** L. Rather hairy, spreading or ascending; leaves obovate-oblong with a wedge-shaped base, 3-cleft and cut or pinnatifid; spikes peduncled, flat-topped in flower; bracts shorter than the calyx; flowers showy, light purple. ① — Prairies, from Illinois southward. Also cultivated. July.

2. LÍPPIA, L. (ZAPÀNIA, *Juss.*)

Calyx often flattened, 2–4-toothed, or 2-lipped. Corolla strongly 2-lipped: upper lip notched; the lower much larger, 3-lobed. Stamens included. Style slender: stigma obliquely capitate. Fruit 2-celled, 2-seeded. (Dedicated to *Lippi*, an Italian naturalist and traveller.)

1. **L. lanceolàta,** Michx. (FOG-FRUIT.) Procumbent or creeping, roughish, green; leaves oblanceolate or wedge-spatulate, serrate above; peduncles axillary, slender, bearing solitary closely bracted heads of bluish-white flowers; calyx 2-cleft, the divisions sharply keeled. (Zapania lanceolàta, & Z. nodiflora, *N. Amer. authors.*) — River-banks, W. Pennsylvania to Illinois, and southward. July–Sept.

3. CALLICÁRPA, L. CALLICARPA.

Calyx 4–5-toothed, short. Corolla tubular-bell-shaped, 4–5-lobed, nearly regular. Stamens 4, nearly equal, exserted: anthers opening at the apex. Style slender, thickened upwards. Fruit a small drupe, with 4 nutlets. — Shrubs, with scurfy pubescence and small flowers in axillary cymes. (Name formed of κάλλος, *beauty*, and καρπός, *fruit.*)

1. **C. Americàna,** L. (FRENCH MULBERRY.) Leaves ovate-oblong with a tapering base, toothed, whitish beneath; calyx obscurely 4-toothed; fruits small, violet-color. — Rich soil, Virginia and southward. May–July. — Shrub 3° high.

4. PHRỲMA, L. LOPSEED.

Calyx cylindrical, 2-lipped; the upper lip of 3 bristle-awl-shaped teeth; the lower shorter, 2-toothed. Corolla 2-lipped; upper lip notched; the lower much larger, 3-lobed. Stamens included. Style slender: stigma 2-lobed. Fruit oblong, 1-celled and 1-seeded! Seed orthotropous. Radicle pointing upwards: cotyledons convolute round their axis. — A perennial herb, with slender branching stems, and coarsely toothed ovate leaves, the lower long-petioled; the small opposite flowers in elongated and slender terminal spikes, reflexed in fruit, and bent close against the common peduncle. Corolla purplish or pale rose-color. (Derivation of the name unknown.)

1. **P. Leptostàchya,** L. — Rich copses, common. July. — Plant 2°–3° high: leaves 3′–5′ long, thin. (Also in the Himalaya Mountains!)

ORDER 77. LABIÀTÆ. (MINT FAMILY.)

Chiefly herbs, with square stems, opposite aromatic leaves, more or less 2-lipped corolla, didynamous or diandrous stamens, and a deeply 4-lobed ovary, which forms in fruit 4 little seed-like nutlets, or achenia, surrounding the base of the single style in the bottom of the persistent calyx, each filled with a single erect seed. — Albumen mostly none. Embryo straight (except in Scutellaria): radicle at the base of the fruit. Upper lip of the corolla 2-lobed or sometimes entire; the lower 3-lobed. Stamens, as in all the allied families, inserted on the tube of the corolla. Style 2-lobed at the apex. Flowers axillary, chiefly in cymose clusters, which are often aggregated in terminal spikes or racemes. Foliage mostly dotted with small glands containing a volatile oil, upon which depends the warmth and aroma of most of the plants of this large and well-known family. (More abundant in the Old World than the New. One third of our genera and many of the species are merely introduced plants.)

Synopsis.

TRIBE I. **AJUGOIDEÆ.** Stamens 4, ascending (curved upwards) and parallel, usually projecting from the notch of the upper side of the (not evidently 2-lipped) 5-lobed corolla. Nutlets reticulated and pitted, obliquely attached by the inside near the base.

* Lobes of the corolla all declined (turned forwards): stamens exserted.

1. TEUCRIUM. Lower lobe of the corolla much larger than the others. Calyx 5-toothed.
2. TRICHOSTEMA. Lobes of the corolla scarcely unequal. Calyx 5-cleft, oblique.

* * Lobes of the corolla almost equally spreading: stamens nearly included.

3. ISANTHUS. Calyx bell-shaped, 5-cleft, almost equalling the small corolla.

TRIBE II. **SATUREIEÆ.** Stamens 4, the inferior pair longer, or only 2, distant, straight, diverging, or converging under the upper lip: anthers 2-celled. Lobes of the corolla flat and spreading. Nutlets smooth or minutely roughened, fixed by the base.

* Corolla not evidently 2-lipped, but almost equally 4-lobed. Stamens erect, distant.

4. MENTHA. Fertile stamens 4, nearly equal.
5. LYCOPUS. Fertile stamens 2; and often 2 sterile filaments without anthers.

* * Corolla more or less 2-lipped; the tube naked within.

+ Stamens only 2, distant: no rudiments of the upper pair.

6. CUNILA. Calyx very hairy in the throat, equally 5-toothed. Corolla small.

+ + Stamens 4, all with anthers.

7. HYSSOPUS. Calyx tubular, 15-nerved, naked in the throat, equally 5-toothed. Stamens exserted, diverging.
8. PYCNANTHEMUM. Calyx ovate or short-tubular, 10–13-nerved, naked in the throat, equally 5-toothed or somewhat 2-lipped. Flowers in dense heads or clusters.
9. ORIGANUM. Calyx ovate-bell-shaped, hairy in the throat, 13-nerved, 5-toothed. Stamens diverging. Flowers spiked, and with large colored bracts.
10. THYMUS. Calyx ovate, nodding in fruit, hairy in the throat, 10–13-nerved, 2-lipped. Stamens distant. Bracts minute. Leaves very small.

11. **SATUREIA.** Calyx bell-shaped, naked in the throat, 10-nerved, equally 5-toothed. Stamens somewhat ascending.

12. **CALAMINTHA.** Calyx tubular, often hairy in the throat, 13-nerved, 2-lipped. Tube of the corolla straight. Stamens connivent at the summit in pairs under the upper lip.

13. **MELISSA.** Calyx tubular-bell-shaped, 2-lipped, flattish on the upper side. Tube of the corolla curved upwards. Stamens curved above, connivent under the erect upper lip.

+ + + Stamens only 2 with anthers, ascending, and a pair of small sterile filaments.

14. **HEDEOMA.** Calyx gibbous on the lower side, hairy in the throat. Flowers loose.

* * * Corolla 2-lipped, with a bearded ring inside at the bottom of the enlarged throat. Stamens 2 or 4, long, diverging.

15. **COLLINSONIA.** Calyx enlarged and declined in fruit, 2-lipped Lower lobe of the corolla much larger than the other four.

TRIBE III. **MONARDEÆ.** Stamens 2 (sometimes with mere rudiments of the upper pair), ascending and parallel: anthers apparently or really 1-celled. Corolla 2-lipped. Nutlets as in Tribe II.

16. **SALVIA.** Calyx 2-lipped Anthers with a long connective astride the filament, bearing a linear cell at the upper end, and none or an imperfect one on the lower.

17. **MONARDA.** Calyx tubular and elongated, equally 5-toothed. Anthers of 2 cells confluent into one: connective inconspicuous.

18. **BLEPHILIA.** Calyx ovate-tubular, 2-lipped. Anthers as in No 17.

TRIBE IV. **NEPETEÆ.** Stamens 4, the superior (inner) pair longer than the inferior! ascending or diverging. Corolla 2-lipped; the upper lip concave or arched, the lower spreading. Calyx mostly 15-nerved. Nutlets as in Tribes II. and III.

19. **LOPHANTHUS.** Stamens divergent; the upper pair curved downwards; the lower ascending: anther-cells nearly parallel.

20. **NEPETA.** Stamens all ascending; the anthers approximate in pairs; the cells at length widely diverging. Calyx curved.

21. **DRACOCEPHALUM.** Stamens nearly as in No. 20. Calyx straight, the upper lip or tooth commonly larger.

22. **CEDRONELLA.** Stamens all ascending. Anther-cells parallel.

TRIBE V. **STACHYDEÆ.** Stamens 4, ascending and parallel; the inferior (outer) pair longer than the superior, except in No. 33 Anthers usually approximate in pairs. Corolla 2-lipped; the upper lip concave or arched. Calyx 5 - 10 nerved. Nutlets as in the preceding.

* Calyx not 2-lipped, thin and membranaceous, inflated-bell-shaped in fruit.

23. **SYNANDRA** Calyx 4-lobed! Anther-cells widely diverging from each other.

24. **PHYSOSTEGIA.** Calyx 5-toothed. Anther-cells parallel.

* * Calyx 2-lipped, closed in fruit.

25. **BRUNELLA.** Calyx nerved and veiny; upper lip flat, 3-toothed, the lower 2-cleft.

26. **SCUTELLARIA.** Calyx with a helmet-like projection on the upper side; the lips entire

* * * Calyx not 2-lipped, nor the tube inflated, 5 - 10-toothed

+ Stamens included in the tube of the corolla.

27. **MARRUBIUM.** Calyx tubular, 5 - 10-nerved, and with 5 or 10 awl-shaped teeth.

+ + Stamens projecting beyond the tube of the corolla.

++ Anthers opening transversely by 2 unequal valves; the smaller valve ciliate.

28. **GALEOPSIS.** Calyx tubular-bell-shaped; the 5 teeth spiny-pointed.

++ ++ Anthers opening lengthwise.

29. **STACHYS.** Calyx tubular-bell-shaped. Nutlets rounded at the top. Stamens after shedding the pollen often turned downward.

30. **LEONURUS.** Calyx top-shaped, the rigid and spiny-pointed teeth soon spreading. Nutlets truncate and acutely 3-angled at the top.

31. **LAMIUM.** Calyx-teeth not spiny-pointed. Nutlets sharply 3-angled, truncate at the top.

32. BALLOTA. Calyx somewhat funnel-form, the 5-10-teeth united at the base into a spreading border. Nutlets roundish at the top. Upper lip of the corolla erect.

33. PHLOMIS. Calyx tubular, the 5 short and broad teeth abruptly awned. Upper lip of the corolla arched.

1. TEÙCRIUM, L. GERMANDER.

Calyx 5-toothed. Corolla with the 4 upper lobes nearly equal, oblong, turned forward, so that there seems to be no upper lip; the lower one much larger. Stamens 4, exserted from the deep cleft between the 2 upper lobes of the corolla: anther-cells confluent. (Named for *Teucer*, king of Troy.)

1. **T. Canadénse,** L. (AMERICAN GERMANDER. WOOD SAGE.) Herbaceous, downy; stem erect (1°-3° high); leaves ovate-lanceolate, serrate, rounded at the base, short-petioled, hoary underneath; the floral scarcely longer than the oblique unequally-toothed calyx; whorls about 6-flowered, crowded in a long and simple wand-like spike. ♃ — Low grounds; not rare. July. — Corolla pale purple, rarely white.

AJÙGA CHAMÆPITHYS, L., the YELLOW BUGLE of Europe, gathered in Virginia by Clayton, has not been noticed since.

2. TRICHOSTÈMA, L. BLUE CURLS.

Calyx bell-shaped, oblique, deeply 5-cleft; the 3 upper teeth elongated and partly united, the 2 lower very short. Corolla 5-lobed; the lobes narrowly oblong, declined, nearly equal in length; the 3 lower more or less united. Stamens 4, with very long capillary filaments, exserted much beyond the corolla, curved: anther-cells divergent and at length confluent. — Low annuals, somewhat clammy-glandular and balsamic, branched, with entire leaves, and mostly solitary 1-flowered pedicels terminating the branches, becoming lateral by the production of axillary branchlets, and the flower appearing to be reversed, namely, the short teeth of the calyx upward, &c. Corolla blue, varying to purple, rarely white, small. (Name composed of θρίξ, *hair*, and στῆμα, *stamen*, from the capillary filaments.)

1. **T. dichótomum,** L. (BASTARD PENNYROYAL.) *Leaves lance-oblong or rhombic-lanceolate*, rarely lance-linear, short-petioled. — Sandy fields, New England to Kentucky, and southward, chiefly eastward.. July-Sept. — The curved stamens ½′ long.

2. **T. lineàre,** Nutt. *Leaves linear*, nearly smooth. — Sandy pine barrens of New Jersey, and southward. — Rather taller and less forked than the last (8′-12′ high), the corolla larger.

3. ISÁNTHUS, Michx. FALSE PENNYROYAL.

Calyx bell-shaped, 5-lobed, equal, enlarged in fruit. Corolla little longer than the calyx; the border bell-shaped, with 5 nearly equal and obovate spreading lobes. Stamens 4, slightly didynamous, incurved-ascending, scarcely exceeding the corolla. — A low, much branched, annual herb, clammy-pubescent, with nearly entire lance-oblong 3-nerved leaves, and small pale blue flowers on short axillary 1 - 3-flowered peduncles. (Name from ἴσος, *equal*, and ἄνθος, *flower*, referring to the almost regular corolla.)

1. **I. cærùleus,** Michx. — Gravelly banks, Maine to Illinois, and southward. July, Aug. — Corolla 2″ long.

4. MÉNTHA, L. MINT.

Calyx bell-shaped or tubular, 5-toothed, equal or nearly so. Corolla with a short included tube; the bell-shaped border somewhat equally 4-cleft; the upper lobe broadest, entire or notched at the apex. Stamens 4, equal, erect, distant (either exserted or included in different individuals of the same species). — Odorous herbs, with the small flowers mostly in close clusters, forming axillary capitate whorls, sometimes approximated in interrupted spikes. Corolla pale purple or whitish. (Μίνθη of Theophrastus, from a Nymph of that name, fabled to have been changed into Mint by the jealous Proserpine.)

1. **M.** VÍRIDIS, L. (SPEARMINT.) *Nearly smooth; leaves almost sessile, ovate-lanceolate,* unequally serrate; whorls of flowers approximate in loose panicled spikes. ♃ — Wet places; common. (Nat. from Eu.)

2. **M.** PIPERÌTA, L. (PEPPERMINT.) *Smooth leaves petioled, ovate-oblong,* acute, serrate; whorls crowded in short obtuse spikes, interrupted at the base. ♃ — Low grounds, and along brooks: less naturalized than the last. Aug. — Multiplying, like the Spearmint, by running under-ground shoots. (Nat. from Eu.)

3. **M.** ARVÉNSIS, L. (CORN MINT.) *Stem hairy downwards; leaves petioled,* ovate or oblong, serrate; *the floral similar* and longer than the globose remote whorls of flowers. ♃ — Fields, Penn. and Ohio: rare. — Odor like that of decayed cheese. (Adv. from Eu.)

4. **M. Canadénsis,** L. (WILD MINT.) Stems ascending (1°-2° high), whitish-hairy; leaves petioled, oblong, tapering to both ends, the uppermost lanceolate; flowers crowded in globular axillary whorls. (Odor like Pennyroyal). Var. GLABRÀTA, *Benth.*, is smoothish, the leaves usually less tapering at the base, "the smell pleasanter, more like that of Monarda" (*Porter*). (M. boreàlis, *Michx.*) ♃ — Wet banks of brooks, New England to Kentucky, and northward. July - Sept.

5. LÝCOPUS, L. WATER HOREHOUND.

Calyx bell-shaped, 4 - 5-toothed, naked in the throat. Corolla bell-shaped, scarcely longer than the calyx, nearly equally 4-lobed. Stamens 2, distant; the upper pair either sterile rudiments or wanting. Nutlets with thickened margins. — Perennial low herbs, resembling Mints, with sharply toothed or pinnatifid leaves, the floral ones similar and much longer than the dense axillary whorls of small mostly white flowers. (Name compounded of λύκος, *a wolf*, and ποῦς, *foot*, from some fancied likeness in the leaves.)

1. **L. Virgínicus,** L. (BUGLE-WEED.) Stem obtusely 4-angled (6′ - 18′ high), producing long and slender runners from the base; leaves oblong or ovate-lanceolate, toothed, entire towards the base, short-petioled; *calyx-teeth* 4,

ovate, bluntish and pointless. — Shady moist places; common, especially northward. Aug. — Smooth, often purplish, with small capitate clusters of very small flowers.

2. **L. Europæus,** L. Stem sharply 4-angled (1°–3° high), with or without runners from the base; leaves ovate-oblong or oblong-lanceolate, sinuate-toothed or pinnatifid, more or less petioled; whorls many-flowered; *calyx-teeth* 5, *triangular-lanceolate, tapering to a rigid very sharp point;* nutlets (smooth or glandular-roughened at the top) equalling or exceeding the calyx-tube. (Eu.) — Includes several nominal species, among them in our district is

Var. **sinuàtus.** (L. sinuatus, *Benth.* L. exaltatus & L. sinuatus, *Ell.*) Much branched, smooth or smoothish; runners short or none; leaves mostly more tapering to both ends than in the European form, varying from cut-toothed to pinnatifid. — Common in wet grounds. July, Aug.

Var. **integrifòlius.** Stems more simple, often producing slender runners; leaves oblong-lanceolate, varying to narrowly lanceolate (L. angustifolius, *Nutt*, &c.), much acuminate at both ends (2′–4′ long), sharply serrate. — Common westward.

6. CUNÌLA, L. DITTANY.

Calyx ovate-tubular, equally 5-toothed, very hairy in the throat. Corolla 2-lipped; upper lip erect, flattish, mostly notched; the lower spreading, 3-cleft. Stamens 2, erect, exserted, distant: no sterile filaments. — Perennials, with small white or purplish flowers, in corymbed cymes or clusters. (An ancient Latin name, of unknown origin.)

1. **C. Mariàna,** L. (COMMON DITTANY.) Stems tufted, corymbosely much branched (1° high); leaves smooth, ovate, serrate, rounded or cordate at the base, nearly sessile, dotted (1′ long); cymes peduncled; calyx striate. — Dry hills, S. New York to Ohio, Kentucky, and southward. July – Sept.

7. HYSSÒPUS, L. HYSSOP.

Calyx tubular, 15-nerved, equally 5-toothed, naked in the throat. Corolla short, 2-lipped; upper lip erect, flat, obscurely notched; the lower 3-cleft, with the middle lobe larger and 2-cleft. Stamens 4, exserted, diverging. — A perennial herb, with wand-like simple branches, lanceolate or linear entire leaves, and blue-purple flowers in small clusters, crowded in a spike. (The ancient name.)

1. H. OFFICINÀLIS, L. — Road-sides, Michigan, &c.; escaped from gardens. (Adv. from Eu.)

8. PYCNÁNTHEMUM, Michx. MOUNTAIN MINT. BASIL.

Calyx ovate-oblong or tubular, about 13-nerved, equally 5-toothed, or the three upper teeth more or less united, naked in the throat. Corolla short, more or less 2-lipped; the upper lip straight, nearly flat, entire or slightly notched; the lower 3-cleft, its lobes all ovate and obtuse. Stamens 4, distant, the lower pair rather longer: anther-cells parallel. — Perennial upright herbs, with a pungent mint-like flavor, corymbosely branched above; the floral leaves often whitened; the many-flowered whorls dense, crowded with bracts, and usually forming terminal heads or close cymes. Corolla whitish or purplish, the lips mostly dotted with purple. Varies, like the Mints, with the stamens exserted or included in different flowers. (Name composed of *πυκνός*, *dense*, and *ἄνθεμον*, *a blossom*; from the inflorescence.)

* *Calyx scarcely at all 2-lipped, the teeth and bracts awl-shaped and awn-pointed, rigid, naked, as long as the corolla: flowers in rather dense mostly terminal heads: leaves rigid, slightly petioled.*

1. **P. aristàtum,** Michx. Minutely hoary-puberulent (1°–2° high); leaves ovate-oblong and oblong-lanceolate, acute, sparingly denticulate-serrate (1′–2′ long), roundish at the base. — Pine barrens, from New Jersey southward.

Var. **hyssopifòlium.** Leaves narrowly oblong or broadly linear, nearly entire and obtuse. (P. hyssopifolium, *Benth.*) — Virginia and southward.

* * *Calyx 2-lipped from the greater union more or less of the 3 upper teeth, which, with the bracts, are subulate and bearded with some spreading hairs: flowers in dense and compound flattened cymes, which become considerably expanded in fruit: leaves membranaceous, petioled.*

2. **P. incànum,** Michx. *Leaves ovate-oblong*, acute, remotely toothed, *downy above and mostly hoary with whitish wool underneath, the uppermost whitened both sides; cymes open;* bracts linear-awl-shaped and, with the calyx-teeth, more or less awn-pointed. — Rocky woods and hills, New England to Michigan, and southward. Aug. — Plant 2°–4° high, the taste intermediate between that of Pennyroyal and Spearmint, as in most of the following species. Very variable.

3. **P. clinopodioìdes,** Torr. & Gr. *Leaves oblong-lanceolate*, scarcely toothed, short-petioled, *not whitened;* the upper surface often smooth, the lower as well as the stem downy; *cymes contracted;* bracts and calyx-teeth short subulate, the latter nearly one half shorter than the tube. — Dry copses around New York. Aug., Sept. — Perhaps an extreme state of No. 2.

* * * *Calyx usually almost equally 5-toothed: flowers crowded in loose heads or dense clusters at the end of the branches and in the uppermost axils; the bracts shorter than the 2-lipped corollas: leaves almost sessile.*

4. **P. Torrèyi,** Benth. Somewhat pubescent; stem strict and nearly simple (2°–3° high); *leaves thin, linear-lanceolate*, tapering to both ends (mostly 2′ long and 2″–3″ wide), nearly entire; the awl-shaped calyx-teeth and bracts canescent. — Dry soil, S. New York and New Jersey. Aug. — Intermediate in aspect between No. 3 and No. 7.

5. **P. pilòsum,** Nutt. More or less *downy with long and soft whitish hairs*, much branched above; *leaves lanceolate, acute at both ends*, or the lower *ovate-lanceolate*, nearly entire, *the floral not whitened;* calyx-teeth ovate-lanceolate, acute, and with the bracts hoary-haired. — Dry hills and plains, W. Penn., Ohio, to Illinois, and southward in the Alleghanies. July–Sept. — A smoother form of this, approaching the next, is, if I mistake not, Brachystemum verticillatum, *Michx.* (Mountains of Penn. and southward.)

6. **P. mùticum,** Pers. *Minutely hoary* throughout, or almost smooth, corymbosely much branched (1°–2½° high); *leaves ovate or broadly ovate-lanceolate*

late, varying to lanceolate, *rather rigid, acute, rounded or slightly heart-shaped at the base,* mostly sessile and minutely sharp-toothed, prominently veined, green when old; *the floral ones,* bracts, and triangular-ovate calyx-teeth, *hoary with a fine close down.* — Dry hills, Maine to Ohio, Kentucky, and southward. Aug. — Flowers in very dense clusters; the outer bracts ovate-lanceolate and pointed, the others pointless.

* * * * *Calyx equally 5-toothed: flowers collected in dense and globular, often fascicled, small and numerous heads, which are crowded in terminal corymbs: bracts rigid, closely appressed, shorter than the flowers: lips of the corolla very short: leaves narrow, sessile, entire, rigid, crowded and clustered in the axils.*

7. **P. lanceolàtum,** Pursh. *Smoothish or minutely pubescent* (2° high); *leaves lanceolate or lance-linear,* obtuse at the base; *heads downy; calyx-teeth short and triangular.* — Dry thickets; common. July – Sept.

8. **P. linifòlium,** Pursh. *Smooth* or nearly so (1° – 2° high); *leaves narrower* and heads less downy than in the last; the narrower *bracts and lance-awl-shaped calyx-teeth pungently pointed.* — Thickets, S. New England to Illinois, and southward. July – Sept.

* * * * * *Calyx equally 5-toothed: flowers collected in few and solitary large and globular heads (terminal, and in the upper axils of the membranaceous petioled leaves); the bracts loose, ciliate-bearded.*

9. **P. montànum,** Michx. Stem (1° – 3° high) and ovate- or oblong-lanceolate serrate leaves glabrous; bracts very acute or awl-pointed, the outermost ovate and leaf-like, the inner linear; teeth of the tubular calyx short and acute. — Alleghanies, from S. Virginia southward. July. — Flavor warm and pleasant. Foliage and heads like a Monarda.

9. ORÍGANUM, L. WILD MARJORAM.

Calyx ovate-bell-shaped, hairy in the throat, striate, 5-toothed. Tube of the corolla about the length of the calyx, 2-lipped; the upper lip rather erect and slightly notched; the lower longer, of 3 nearly equal spreading lobes. Stamens 4, exserted, diverging. — Perennials, with nearly entire leaves, and purplish flowers crowded in cylindrical or oblong spikes, which are imbricated with colored bracts. (An ancient Greek name, said to be from ὄρος, *a mountain,* and γάνος, *delight.*)

1. **O. VULGÀRE,** L. Upright, hairy, corymbose at the summit; leaves petioled, round-ovate; bracts ovate, obtuse, purplish. — Dry banks, sparingly introduced eastward. June – Oct. (Nat. from Eu.)

10. THỲMUS, L. THYME.

Calyx ovate, 2-lipped, 13-nerved, hairy in the throat; the upper lip 3-toothed, spreading; the lower 2-cleft, with the awl-shaped divisions ciliate. Corolla short, slightly 2-lipped; the upper lip straight and flattish, notched at the apex; the lower 3-cleft. Stamens 4, straight and distant, usually exserted. — Low perennials, with small and entire strongly-veined leaves, and purplish or whitish

flowers. (The ancient Greek name of the Thyme, probably from θύω, *to burn perfume*, because it was used for incense.)

1. **T.** Serpýllum, L. (Creeping Thyme.) Prostrate; leaves green, flat, ovate, entire, short-petioled, flowers crowded at the end of the branches.—Old fields, E. New England and Penn.: rare. (Adv. from Eu.)

T. vulgàris, L., is the Garden Thyme, or Standing Thyme.

11. SATUREÌA, L. Savory.

Calyx bell-shaped, 10-nerved, equally 5-toothed, naked in the throat. Corolla 2-lipped; the upper lip erect, flat, nearly entire, the lower nearly equally 3-cleft. Stamens 4, somewhat ascending.—Aromatic plants, with narrow entire leaves, often clustered in the axils, and somewhat spiked purplish flowers. (The ancient Latin name.)

1. **S.** horténsis, L. (Summer Savory.) Pubescent; clusters few-flowered; bracts small or none. ①—Prairies of Illinois, and rocky islands at the Falls of the Ohio, *Short:* escaped from gardens. (Adv. from Eu.)

12. CALAMÍNTHA, Mœnch. Calaminth.

Calyx tubular, 13-nerved, mostly hairy in the throat, 2-lipped; the upper lip 3-cleft, the lower 2-cleft. Corolla with a straight tube and an inflated throat, distinctly 2-lipped; the upper lip erect, flattish, entire; the lower spreading, 3-parted, the middle lobe usually largest. Stamens 4, mostly ascending; the anthers usually approximate in pairs.—Perennials, with mostly purplish or whitish flowers: inflorescence various. (Name composed of καλός, *beautiful*, and μίνθα, *Mint*.)

§ 1. CALAMÍNTHA Proper, Benth.—*Calyx striate, scarcely gibbous at the base: clusters of flowers loose and peduncled in the axils of the leaves, and forming a raceme at the summit: bracts minute.*

1. **C.** Népeta, Link. (Basil-Thyme.) Soft hairy; stem ascending (1°-3° high); leaves petioled, broadly ovate, obtuse, crenate; corolla (3'' long) about twice the length of the calyx.—Dry hills, Virginia, &c. (Nat. from Eu.)

§ 2. CALOMELÍSSA, Benth.—*Calyx nearly as* § 1: *whorls few-several-flowered, sessile; flowers on slender naked pedicels; the bracts at their base linear or oblong, leaflike.*

2. **C. glabélla,** Benth. Smooth; stems diffuse or spreading (1°-2° long); leaves slightly petioled, oblong or oblong-linear, narrowed at the base (¾'-1' long, or the largest 1½'-2' long), sparingly toothed, or nearly entire; clusters 6-10-flowered; corolla (purplish, 5''-6'' long) fully twice the length of the calyx, the teeth of the latter awl-pointed. (Cunila glabella, *Michx.* Micromeria, *Benth.*)—Limestone banks, near Frankfort, Kentucky (*Short*), and southward. June.

Var. **Nuttállii.** Smaller; the flowering stems more upright (5'-9' high), with narrower mostly entire leaves and fewer-flowered clusters; while sterile the runners from the base bear ovate thickish leaves only 2''-5'' long. (C. Nuttallii, *Benth.* Micromeria glabella, var. angustifolia, *Torr.*) — Wet limestone rocks, Niagara Falls to Wisconsin, Central Ohio (*Sullivant*), and southwestward. July – Sept. — Appearing very distinct, but united by Southwestern forms, &c.

§ 3. CLINOPODIUM, L. — *Calyx more or less gibbous below: clusters sessile and many-flowered, crowded with awl-shaped bracts.*

3. **C.** Clinopòdium, Benth. (Basil.) Hairy, erect (1° – 2° high); leaves ovate, petioled, nearly entire; flowers (pale purple) in globular clusters; hairy bracts as long as the calyx. (Clinopodium vulgare, *L.*) — Borders of thickets and fields. July. (Nat. from Eu.)

13. MELÍSSA, L. Balm.

Calyx with the upper lip flattened and 3-toothed, the lower 2-cleft. Corolla with a recurved-ascending tube. Stamens 4, curved and conniving under the upper lip. Otherwise nearly as Calamintha. — Clusters few-flowered, loose, one-sided, with few and mostly ovate bracts resembling the leaves. (Name from *μέλισσα, a bee;* the flowers yielding abundance of honey.)

1. **M.** officinàlis, L. (Common Balm.) Upright, branching; leaves broadly ovate, crenate-toothed, exhaling the odor of lemons; the corolla white or cream-color. — Sparingly escaped from gardens. (Adv. from Eu.)

14. HEDEÒMA, Pers. Mock Pennyroyal.

Calyx ovoid or tubular, gibbous on the lower side near the base, 13-nerved, bearded in the throat, 2-lipped; the upper lip 3-toothed, the lower 2-cleft. Corolla 2-lipped; the upper lip erect, flat, notched at the apex; the lower spreading, 3-cleft. Fertile stamens 2; the upper pair reduced to sterile filaments or wanting. — Low, odorous plants, with small leaves, and loose axillary clusters of flowers, often forming terminal leafy racemes. (Altered from Ἡδύοσμον, an ancient name of Mint, from its sweet scent.)

1. **H. pulegioides,** Pers. (American Pennyroyal.) Erect, branching, hairy; *leaves petioled, oblong-ovate, obscurely serrate,* the floral similar; whorls few-flowered; corolla (bluish, pubescent) scarcely exceeding the calyx; sterile filaments tipped with a little head. ① — Open barren woods and fields; common. July – Sept. — Plant 6′ – 10′ high, with nearly the taste and odor of the true *Pennyroyal* (Mentha Pulegium) of Europe.

2. **H. hispida,** Pursh. Erect hairy (2′ – 5′ high); *leaves sessile, linear, entire,* the floral similar and exceeding the flowers; corolla scarcely longer than the *ciliate hispid calyx.* ① — Illinois, opposite St. Louis, and southwestward.

15. COLLINSÒNIA, L. Horse-Balm.

Calyx ovate, enlarged and declined in fruit, 2-lipped; upper lip truncate and flattened, 3-toothed, the lower 2-cleft. Corolla elongated, expanded at the throat, somewhat 2-lipped; the 4 upper lobes nearly equal, but the lower much larger and longer, pendent, toothed or lacerate-fringed. Stamens 2 (sometimes 4, the upper pair shorter), much exserted, diverging: anther-cells divergent. —

Strong-scented perennials, with large ovate leaves, and yellowish flowers on slender pedicels, in loose and panicled terminal racemes. (Named in honor of *Peter Collinson*, a well-known patron of science and correspondent of Linnæus, and who introduced this plant into England.)

1. **C. Canadénsis,** L. (RICH-WEED. STONE-ROOT.) Nearly smooth (1° - 3° high); leaves serrate, pointed, petioled (3′ - 9′ long); panicle loose, many-flowered; stamens 2. — Rich moist woods, New England to Michigan, Kentucky, and southward. July - Sept. — Corolla ½′ long, exhaling the odor of lemons.

16. SÁLVIA, L. SAGE.

Calyx naked in the throat, 2-lipped; the upper lip 3-toothed or entire, the lower 2-cleft. Corolla deeply 2-lipped, ringent; the upper lip straight or scythe-shaped, entire or barely notched; the lower spreading or pendent, 3-lobed, the middle lobe larger. Stamens 2, on short filaments, jointed with the elongated transverse connective, one end of which ascending under the upper lip bears a linear 1-celled (half-) anther, the other usually descending and bearing an imperfect or deformed (half-) anther. — Flowers mostly large and showy, in spiked, racemed, or panicled whorls. (Name from *salvo*, to save, in allusion to the reputed healing qualities of Sage.)

1. **S. lyràta,** L. (LYRE-LEAVED SAGE.) Low (10′ - 20′ high), *somewhat hairy; stem nearly simple and naked; root-leaves obovate, lyre-shaped* or sinuate-pinnatifid, sometimes almost entire; *those of the stem mostly a single pair,* smaller and narrower; the floral oblong-linear, not longer than the calyx; whorls loose and distant, forming an interrupted raceme; upper lip of the blue-purple pubescent corolla short, straight, not vaulted. ♃ — Woodlands and meadows, New Jersey to Ohio, Kentucky, and southward. June.

2. **S. urticifòlia,** L. (NETTLE-LEAVED SAGE.) *Downy with clammy hairs, leafy; leaves rhombic-ovate,* pointed, crenate, rounded or slightly heart-shaped at the base, narrowed into a short petiole, the floral nearly similar; whorls remote, many-flowered; upper lip of the blue corolla erect, one third the length of the lower; style bearded. ♃ — Woodlands, from Maryland southward. — Corolla ½′ long; the lateral lobes deflexed, the middle notched.

S. OFFICINÀLIS, L., is the well-known GARDEN SAGE. Several scarlet species from Tropical America are cultivated for ornament.

17. MONÁRDA, L. HORSE-MINT.

Calyx tubular, elongated, 15-nerved, nearly equally 5-toothed, usually hairy in the throat. Corolla elongated with a slightly expanded throat, and a strongly 2-lipped limb; the lips linear or oblong, somewhat equal; the upper erect, entire or slightly notched; the lower spreading, 3-lobed at the apex, the lateral lobes ovate and obtuse, the middle one narrower and slightly notched. Stamens 2, elongated, ascending, inserted in the throat of the corolla: anthers linear (the divaricate cells confluent at the junction). — Odorous erect herbs, with entire or toothed leaves, and pretty large flowers in a few whorled heads, closely surrounded with bracts. (Dedicated to *Monardez*, an early Spanish botanist.)

* *Stamens and style exserted beyond the very narrow and acute upper lip of the corolla: root perennial.*

1. **M. dídyma,** L. (Oswego Tea.) Somewhat hairy; leaves petioled, ovate-lanceolate, pointed, rounded or slightly heart-shaped at the base; the floral ones and the large outer bracts tinged with red; *calyx smooth, incurved, nearly naked in the throat; corolla smooth, much elongated* (2' long), *bright red.* — Moist woods by streams, N. England to Wisconsin northward, and southward in the Alleghanies: often cultivated (under the name of *Balm* or *Bee-Balm*). July. — Plant 2° high, with very showy flowers.

2. **M. fistulòsa,** L. (Wild Bergamot.) Smoothish or downy; *leaves petioled, ovate-lanceolate* from a rounded or slightly heart-shaped base; the uppermost and outer bracts somewhat colored (whitish or purplish); *calyx* slightly curved, *very hairy in the throat; corolla purplish, rose-color or almost white,* smooth or hairy. — Woods and rocky banks, W. Vermont to Wisconsin, and southward, principally westward. July–Sept. — Very variable in appearance, 2°–5° high; the pale corolla smaller than in the last.

3. **M. Bradburiàna,** Beck. *Leaves nearly sessile, ovate-lanceolate, rounded at the base, clothed with long soft hairs, especially underneath;* the floral and the outer bracts somewhat heart-shaped, purplish; *calyx* smoothish, *contracted above, very hairy in the throat, with awl-shaped awned teeth;* corolla smoothish, bearded at the tip of the upper lip, scarcely twice the length of the calyx, pale purplish, the lower lip dotted with purple. — River-banks and plains, Ohio to Illinois, and westward. July.

* * *Stamens not exceeding the notched upper lip of the short corolla.*

4. **M. punctàta,** L. (Horse-Mint.) Minutely downy (2°–3° high); leaves petioled, lanceolate, narrowed at the base; bracts lanceolate, obtuse at the base, sessile, yellowish and purple; teeth of the downy calyx short and rigid, awnless; corolla nearly smooth, yellowish, the upper lip spotted with purple, the tube scarcely exceeding the calyx. — Sandy fields and dry banks, New York to Virginia, and southward. Aug., Sept. — Very odorous and pungent.

18. BLEPHÍLIA, Raf. Blephilia.

Calyx ovoid-tubular, 13-nerved, 2-lipped, naked in the throat; upper lip with 3 awned teeth, the lower with 2 nearly awnless teeth. Corolla inflated in the throat, strongly and nearly equally 2-lipped; the upper lip erect, entire; the lower spreading, 3-cleft, with the lateral lobes ovate and rounded, larger than the oblong and notched middle one. Stamens 2, ascending, exserted (the rudiments of the upper pair minute or none): anthers, &c. as in Monarda. — Perennial herbs, with nearly the foliage, &c. of Monarda; the small pale bluish-purple flowers crowded in axillary and terminal globose capitate whorls. (Name from βλεφαρίς, *the eyelash,* in reference to the hairy-fringed bracts and calyx-teeth.)

1. **B. ciliàta,** Raf. Somewhat downy; *leaves almost sessile, oblong-ovate, narrowed at the base,* whitish-downy underneath; outer *bracts ovate,* acute, colored, ciliate, as long as the calyx. (Monarda ciliata, *L.*) — Dry open places,

Penn. to Kentucky and Wisconsin. July. — Plant 1° - 2° high, less branched than the next, the hairy corolla shorter.

2. **B. hirsùta,** Benth. Hairy throughout; *leaves long-petioled, ovate, pointed, rounded or heart-shaped at the base;* the lower floral ones similar, the uppermost and the *bracts linear-awl-shaped,* shorter than the long-haired calyx. (B. nepetoides, *Raf.* Monarda hirsuta, *Pursh.*) — Damp rich woods, N. New York to Wisconsin and Kentucky. July. — Plant 2° - 3° high, with spreading branches, and numerous close whorls, the lower remote. Corolla smoothish, pale, with darker purple spots.

19. LOPHÁNTHUS, Benth. Giant Hyssop.

Calyx tubular-bell-shaped, 15-nerved, oblique, 5-toothed, the upper teeth rather longer than the others. Corolla 2-lipped; the upper lip nearly erect, 2-lobed; the lower somewhat spreading, 3-cleft, with the middle lobe crenate. Stamens 4, exserted; the upper pair declined; the lower and shorter pair ascending, so that the pairs cross. Anther-cells nearly parallel. — Perennial tall herbs, with petioled serrate leaves, and small flowers crowded in interrupted terminal spikes. (Name from λόφος, *a crest,* and ἄνθος, *a flower.*)

1. **L. nepetoìdes,** Benth. *Smooth,* or nearly so; leaves ovate, somewhat pointed, coarsely crenate-toothed (2′ - 4′ long); *calyx-teeth ovate, rather obtuse, little shorter than the pale greenish-yellow corolla.* — Borders of woods, W. Vermont to Wisconsin, and southward. Aug. — Stem stout, 4° - 6° high, sharply 4-angled. Spikes 2′ - 6′ long, crowded with the ovate pointed bracts.

2. **L. scrophulariæfòlius,** Benth. Stem (obtusely 4-angled) and lower surface of the ovate or somewhat heart-shaped acute leaves more or less *pubescent; calyx-teeth lanceolate, acute, shorter than the purplish corolla* (spikes 4′ - 15 long): otherwise like the last. — Same geographical range.

3. **L. anisàtus,** Benth. (Anise Hyssop.) Smooth, but the ovate acute *leaves glaucous-white underneath* with minute down; *calyx-teeth lanceolate, acute.* — Plains, Wisconsin? and northwestward. — Foliage with the taste and smell of anise.

20. NÉPETA, L. Cat-Mint.

Calyx tubular, often incurved, obliquely 5-toothed. Corolla dilated in the throat, 2-lipped; the upper lip erect, rather concave, notched or 2-cleft; the lower spreading, 3-cleft, the middle lobe largest, either 2-lobed or entire. Stamens 4, ascending under the upper lip, the lower pair shorter. Anthers approximate in pairs; the cells divergent. — Perennial herbs. (The Latin name, thought to be derived from *Nepete,* an Etrurian city.)

§ 1. *Cymose clusters rather dense and many-flowered, forming interrupted spikes or racemes: upper floral leaves small and bract-like.*

1. **N. Catària,** L. (Catnip.) Downy, erect, branched; leaves heart-shaped, oblong, deeply crenate, whitish-downy underneath; corolla whitish, dotted with purple. — Manured and cultivated grounds, a very common weed July, Aug. (Adv. from Eu.)

§ 2. GLECHÒMA, L. — *Leaves all alike: the axillary clusters loosely few-flowered.*

2. **N.** Glechòma, Benth. (Ground Ivy. Gill.) Creeping and trailing; leaves petioled, round kidney-shaped, crenate, green both sides; corolla thrice the length of the calyx, light blue. (Glechoma hederàcea, *L.*) — Shaded, waste grounds near dwellings. May - Aug. — Anthers with the cells diverging at a right angle, each pair approximate and forming a cross. (Adv. from Eu.)

21. DRACOCÉPHALUM, L. Dragon-head.

Calyx tubular, 13 - 15-nerved, straight, 5-toothed; the upper tooth usually much largest. Corolla 2-lipped; the upper lip slightly arched and notched; the lower spreading, 3-cleft, with its middle lobe largest and 2-cleft or notched at the end. Stamens 4, ascending under the upper lip; the lower pair shorter. Anthers approximate by pairs, the cells divergent. — Whorls many-flowered, mostly spiked or capitate, and with awn-toothed or fringed leafy bracts. (Name from δράκων, *a dragon*, and κεφαλή, *head*, alluding to the form of the corolla.)

1. **D. parviflòrum,** Nutt. Stem erect, leafy (8′ - 20′ high); leaves ovate-lanceolate, sharply cut-toothed, petioled; whorls crowded in a terminal head or spike; upper tooth of the calyx ovate, nearly equalling the bluish small slender corolla. ② — Rocky places, Jefferson and St. Lawrence Counties, New York; shore of Lake Superior, and northwestward. May - Aug.

22. CEDRONÉLLA, Mœnch. Cedronella.

Calyx rather obliquely 5-toothed, many-nerved. Corolla ample, expanded at the throat, 2-lipped; the upper lip flattish or concave, 2-lobed; the lower 3-cleft, spreading, the middle lobe largest. Stamens 4, ascending; the lower pair shorter. Anther-cells parallel. — Sweet-scented perennials, with pale purplish flowers. (Name a diminutive of κέδριον, *oil of Cedar*, from the aromatic leaves of the originial species, C. triphylla, the *Balm-of-Gilead* of English gardens.)

1. **C. cordàta,** Benth. Low, with slender runners, hairy; leaves broadly heart-shaped, crenate, petioled, the floral shorter than the calyx; whorls few-flowered, approximate at the summit of short ascending stems; corolla hairy inside (1½′ long); stamens shorter than the upper lip. (Dracocephalum cordatum, *Nutt.*) — Low shady banks of streams, W. Penn. to Kentucky, and southward along the mountains. June.

23. SYNÁNDRA, Nutt. Synandra.

Calyx bell-shaped, inflated, membranaceous, irregularly veiny, almost equally 4-toothed! Corolla with a long tube, much expanded above and at the throat; the upper lip slightly arched, entire; the lower spreading and 3-cleft, with ovate lobes, the middle one broadest and notched at the end. Stamens 4, ascending: filaments hairy: anthers approximate in pairs under the upper lip; the two upper each with one fertile and one smaller sterile cell, the latter cohering with each other (whence the name; from σύν, *together*, and ἀνήρ, for *anther*).

1. **S. grandiflòra,** Nutt. — Shaded banks, Ohio, Kentucky, and southward. June. — A perennial? hairy herb, 1° high. Lower leaves long-petioled,

broadly ovate, heart-shaped, crenate, thin; the floral sessile, gradually reduced to bracts, each with a single sessile flower. Corolla 1½′ long, yellowish-white.

24. PHYSOSTÈGIA, Benth. FALSE DRAGON-HEAD.

Calyx nearly equally 5-toothed, obscurely 10-nerved, short-tubular or bell-shaped, enlarged, and more or less inflated in fruit. Corolla funnel-form with a much inflated throat, 2-lipped; the upper lip rather erect, concave, nearly entire; the lower 3-parted, spreading, small: its middle lobe larger, broad and rounded, notched. Stamens 4, ascending under the upper lip: anthers approximate; the cells parallel.—Perennial smooth herbs, with upright wand-like stems, and sessile lanceolate or oblong mostly serrate leaves. Flowers large and showy, rose or flesh-color variegated with purple, opposite, crowded in simple or panicled terminal leafless spikes. (Name from φῦσα, *a bladder*, and στέγω, *to cover*, on account of the inflated corolla and fruiting calyx.)

1. **P. Virginiàna,** Benth. (Dracocephalum Virginianum, *L.*, &c.)—Low or wet banks of streams, W. New York to Wisconsin and southward. July–Sept.—Varies from 1°–4° high, stout or slender; the leaves from oblong-obovate (the lower) to narrowly lanceolate, and from very sharply toothed to nearly entire; the flowers either crowded, imbricated, or scattered; the inflated fruiting calyx varying from obovate or ovate to globular; the corolla from 6″ or 7″ to 12″ long: no definite marks are yet found for distinguishing two or more species.

25. BRUNÉLLA, Tourn. (Prunella, *L.*) SELF-HEAL.

Calyx tubular-bell-shaped, somewhat 10-nerved and reticulated-veiny, flattened on the upper side, naked in the throat, closed in fruit, 2-lipped; the upper lip broad and flat, truncate, with 3 short teeth; the lower 2-cleft. Corolla ascending, slightly contracted at the throat, and dilated at the lower side just beneath it, 2-lipped; the upper lip erect, arched, entire; the lower reflexed-spreading, 3-cleft; its lateral lobes oblong; the middle one rounded, concave, crenulate. Stamens 4, ascending under the upper lip: filaments 2-toothed at the apex, the lower tooth bearing the anther. Anthers approximate in pairs, their cells diverging.—Low perennials, with nearly simple stems, and 3-flowered clusters of flowers sessile in the axils of round and bract-like membranaceous floral leaves, imbricated in a close spike or head. (Name said to be taken from the German *braune*, a disease of the throat, for which this plant was a reputed remedy.)

1. **B. vulgàris,** L. (COMMON SELF-HEAL or HEAL-ALL.) Leaves ovate-oblong, entire or toothed, petioled, hairy or smoothish; corolla (violet or flesh-color) not twice the length of the purplish calyx.—Woods and fields; common. Aug. (Eu.)

26. SCUTELLÀRIA, L. SKULLCAP.

Calyx bell-shaped in flower, 2-lipped; the lips entire, closed in fruit, the upper with a helmet-like at length concave and enlarged appendage on the back (the upper sepal); calyx splitting to the base at maturity, the upper lip usually fall-

ing away. Corolla with an elongated curved ascending tube, dilated at the throat, 2-lipped; the upper lip arched, entire or barely notched; the lateral lobes mostly connected with the upper rather than the lower lip; the lower lobe or lip spreading and convex, notched at the apex. Stamens 4, ascending under the upper lip: anthers approximate in pairs, ciliate or bearded; those of the lower stamens 1-celled (halved), of the upper 2-celled and heart-shaped. — Bitter perennial herbs, not aromatic, with axillary or else spiked or racemed flowers; the short peduncles chiefly opposite, 1-flowered, often 1-sided. (Name from *scutella*, a dish, in allusion to the form of the appendage to the fruiting calyx.)

* *Flowers (blue) in terminal racemes; the floral leaves, except the lower ones, being small, and reduced to bracts.*

+– *Lips short, nearly equal in length; the lateral lobes rather distinct, and almost as long as the straightish or scarcely incurved upper lip: leaves on slender petioles.*

1. **S. versícolor,** Nutt. *Soft hairy,* the hairs of the inflorescence, &c. partly viscid-glandular; stem mostly erect (1° - 3° high); *leaves ovate or round-ovate, chiefly heart-shaped,* crenate-toothed, very veiny, *rugose,* the floral reduced to broadly ovate entire bracts about equalling the glandular-hairy calyx; racemes mostly simple. — River-banks, &c., Penn. to Wisconsin and southward. July. — Corolla ¾' long, with a slender tube, below whitish, the lower lip purple-spotted; the upper deep blue; the lateral lobes belonging as much to the lower as to the upper lip. — S. saxatilis, var.? pilosior, *Benth.*, is probably a smaller form of this, as is S. rugosa, *Wood.* (Harper's Ferry, *Aikin, Wood.*)

2. **S. saxátilis,** Riddell. *Smoothish or slightly hairy;* stem weak, ascending (6' - 18' long), often producing runners, branched; *leaves ovate or ovate-oblong and mostly heart-shaped,* coarsely crenate-toothed (1' - 2' long), *thin, obtuse;* upper bracts oblong or ovate, small; racemes loose. — Moist shaded banks, S. Ohio, Virginia, and Kentucky, and southward in the mountains. June, July. — Corolla ¾' long, the lateral lobes connected with the straightish upper lip.

+– +– *Lateral lobes of the corolla small, much shorter than the decidedly arched or incurved upper lip, and connected with it: stem erect: leaves moderately petioled, except in No. 6.*

3. **S. canéscens,** Nutt. Stem branched (2° - 4° high), above, with the *panicled many-flowered racemes, flowers, and the lower surface of the ovate or lance-ovate acute* (at the base acute, obtuse, or cordate) *crenate leaves, whitish with fine soft down,* often becoming rather glabrous; bracts oblong or lanceolate; upper lip of the corolla shorter than the lower. — Rich ground, Penn. to Michigan and southward. July. — Corolla ⅜' long.

4. **S. serràta,** Andrews. *Green and nearly glabrous;* stem rather simple (1° - 3° high), with single loosely-flowered racemes; *leaves serrate, acuminate at both ends,* ovate or ovate-oblong; calyx, &c. somewhat hairy; *lips of the corolla equal* in length (corolla 1' long, the tube more tapering below than in the last, which this resembles). — Woods, Maryland, Illinois, and southward. July.

5. **S. pilòsa,** Michx. *Pubescent with spreading hairs;* stem nearly simple (1° - 3° high); *leaves rather distant, crenate, oblong-ovate, obtuse,* varying to roundish-ovate, the lower abrupt or heart-shaped at the base and long-petioled, the upper on short margined petioles, veiny; bracts oblong-spatulate; racemes

short, often branched; *corolla* (½′ – ⅔′ long) *rather narrow*, the lower lip a little shorter. (S. hirsùta, *Short*, is a large form.) — Dry open woods, &c., S. New York to Michigan and southward. June – Aug.

6. **S. integrifòlia,** L. *Downy all over with a minute hoariness;* stem commonly simple (1° – 2° high); *leaves oblong-lanceolate or linear, mostly entire,* obtuse, very short-petioled; raceme often branched; *corolla* (1′ long) *much enlarged above, the ample lips equal* in length. — Borders of thickets, &c. from Bridgewater, Mass. (*Mr. Howard*), to Pennsylvania and southward. June – Aug.

* * *Flowers (blue or violet, short-peduncled) solitary in the axils of the upper mostly sessile leaves, which are similar to the lower ones.*

+ *Corolla (2″ – 3″ long) seldom thrice the length of the calyx; the short lips nearly equal in length, the upper lip concave.*

7. **S. nervòsa,** Pursh. *Smooth,* simple or branched, slender (10′ – 20′ high); *lower leaves roundish; the middle ones ovate, toothed, somewhat heart-shaped* (1′ long); the upper floral ovate-lanceolate, entire; the nerve-like veins prominent underneath. (S. gracilis, *Nutt.*) — Moist thickets, New York to Illinois and Kentucky. June.

8. **S. párvula,** Michx. *Minutely downy, dwarf* (3′ – 6′ high), branched and spreading; *lowest leaves round-ovate; the others ovate or lance-ovate, obtuse, all entire* or nearly so, *slightly heart-shaped* (½′ – ⅔′ long). (S. ambígua, *Nutt.*) — Dry banks, W. New England to Wisconsin and southward. May, June.

+ + *Corolla (⅔′ – ¾′ long), with a slender tube: lower lip large and rather longer than the somewhat arched upper lip.*

9. **S. galericulàta,** L. Smooth or a little downy, erect (1° – 2° high); leaves ovate-lanceolate, acute, serrate, roundish and slightly heart-shaped at the base (1′ – 2′ long). — Wet shady places; common everywhere northward. Aug. (Eu.)

* * * *Flowers small (blue, 3″ long), in axillary, and often also in terminal one-sided racemes; the lower floral leaves like the others, the upper small and bract-like.*

10. **S. laterifiòra,** L. Smooth; stem upright, much branched (1° – 2° high); leaves lanceolate-ovate or ovate-oblong, pointed, coarsely serrate, rounded at the base, petioled (2′ – 3′ long). — Wet shaded places; common. Aug. — A quack having formerly vaunted its virtues as a remedy for hydrophobia, this species bears the name of *Mad-dog Skullcap.*

27. MARRÙBIUM, L. HOREHOUND.

Calyx tubular, 5 – 10-nerved, nearly equally 5 – 10-toothed; the teeth more or less spiny-pointed and spreading at maturity. Upper lip of the corolla erect, notched; the lower spreading, 3-cleft, its middle lobe broadest. Stamens 4, *included in the tube of the corolla.* Nutlets not truncate. — Whitish-woolly bitter-aromatic perennials, branched at the base, with rugose and crenate or cut leaves, and many-flowered axillary whorls. (A name of Pliny, said to be derived from the Hebrew *marrob*, a bitter juice.)

1. **M.** VULGÀRE, L. (COMMON HOREHOUND.) Stems ascending; leaves round-ovate, petioled, crenate-toothed; whorls capitate; calyx with 10 recurved

teeth, the alternate ones shorter; corolla small, white. — Escaped from gardens into waste places. (Nat. from Eu.)

28. GALEÓPSIS, L. Hemp-Nettle.

Calyx tubular-bell-shaped, about 5-nerved, with 5 somewhat equal and spiny-tipped teeth. Corolla dilated at the throat; the upper lip ovate, arched, entire; the lower 3-cleft, spreading; the lateral lobes ovate, the middle one inversely heart-shaped; palate with 2 teeth at the sinuses. Stamens 4, ascending under the upper lip: *anther-cells transversely 2-valved;* the inner valve of each cell bristly-fringed, the outer one larger and naked. — Annuals, with spreading branches, and several - many-flowered whorls in the axils of floral leaves which are nearly like the lower ones. (Name composed of γαλέη, *a weasel*, and ὄψις, *resemblance*, from some likeness of the corolla to the head of a weasel.)

1. **G. Tetràhit**, L. (Common Hemp-Nettle.) *Stem swollen below the joints, bristly-hairy; leaves ovate,* coarsely serrate; corolla purplish, or variegated, about twice the length of the calyx; or, in var. grandiflòra, 3 – 4 times the length of the calyx, often yellowish with a purple spot on the lower lip. — Waste places, rather common. Aug. (Nat. from Eu.)

2. **G. Ládanum**, L. (Red Hemp-Nettle.) *Stem smooth or pubescent; leaves oblong-lanceolate,* more or less downy; corolla red or rose-color (the throat often spotted with yellow), usually much exceeding the calyx. — Chelsea Beach, near Boston, *Bigelow*. Aug. (Adv. from Eu.)

29. STÀCHYS, L. Hedge-Nettle.

Calyx tubular-bell-shaped, 5 – 10-nerved, equally 5-toothed, or the upper teeth united to form an upper lip. Corolla not dilated at the throat; the upper lip erect or rather spreading, often arched, entire or nearly so; the lower usually longer and spreading, 3-lobed, with the middle lobe largest and nearly entire. Stamens 4, ascending under the upper lip (often reflexed on the throat after flowering): anthers approximate in pairs. Nutlets obtuse, not truncate. — Whorls 2 - many-flowered, approximate in a terminal raceme or spike (whence the name, from στάχυς, *a spike*).

* *Root annual: stems decumbent, low.*

1. **S. arvénsis**, L. (Woundwort.) Hairy; leaves petioled, ovate, obtuse, crenate, heart-shaped at the base; axillary whorls 4 – 6-flowered, distant; corolla (purplish) scarcely longer than the soon declined unarmed calyx. — Waste places, E. Massachusetts; scarce. (Adv. from Eu.)

* * *Root perennial: stem erect.*

2. **S. palústris**, L. Stem 4-angled (2° – 3° high), leafy, hirsute with spreading or reflexed hairs, especially on the angles; leaves sessile, or the lower short-petioled, oblong- or ovate-lanceolate, crenately serrate, rounded or heart-shaped at the base, downy or hairy-pubescent, obtusish (2′ – 4′ long), the upper floral ones shorter than the nearly sessile calyx; whorls 6 – 10-flowered, the upper crowded into an interrupted spike; calyx hispid, the lance-subulate teeth

somewhat spiny, half the length of the purple corolla, diverging in fruit. — Wet banks of streams, &c., mostly northward. June – Aug. (Eu.) — To this, for the present, we must refer all the following as varieties, different as some of them are: —

Var. **áspera.** (S. aspera, *Michx.*) Stem more commonly smooth on the sides, the angles beset with stiff reflexed bristles; leaves hairy or smoothish, pointed, the lower petioled, the lower floral as long as the flowers; spike often slender and more interrupted; calyx-tube rather narrower and the teeth more awl-shaped and spiny. — Common in wet grounds. — This passes into

Var. **glàbra.** (S. glabra, *Riddell, suppl. cat. Ohio pl.* 1836.) More slender, *smooth and glabrous throughout*, or with few bristly hairs; leaves oblong- or ovate-lanceolate, taper-pointed, more sharply toothed, mostly rounded or truncate at the base, *all petioled.* — W. New York (*Sartwell*) to Michigan and southwestward.

Var. **cordàta.** (S. cordata, *Riddell, l. c.* S. Nuttallii, *Shuttlew.*) Stem beset with spreading or reflexed bristly hairs; leaves hairy or smoothish, oblong, *heart-shaped at the narrowed* base, all more or less petioled; calyx-teeth sometimes shorter. — Common westward and southward.

3. **S. hyssopifòlia,** Michx. Smooth and glabrous, or nearly so; stems slender (1° high), the angles sometimes reflexed-bristly; *leaves linear-oblong, or narrowly linear, sessile,* obscurely toothed towards the apex; whorls 4 – 6-flowered, rather distant; corolla (violet-purple) twice or thrice the length of the triangular-awl-shaped spreading calyx-teeth. ♃ — Wet sandy places, Massachusetts to Michigan, and southward: rather rare. July.

BETÓNICA OFFICINÀLIS, the WOOD BETONY of Europe, — of a genus hardly distinct from Stachys, — was found by C. J. Sprague in a thicket at Newton, Massachusetts.

30. LEONÙRUS, L. MOTHERWORT.

Calyx top-shaped, 5-nerved, with 5 nearly equal teeth which are awl-shaped, and when old rather spiny-pointed and spreading. Upper lip of the corolla oblong and entire, somewhat arched; the lower spreading, 3-lobed; its middle lobe larger, broad and inversely heart-shaped, the lateral ones oblong. Stamens 4, ascending under the upper lip: anthers approximate in pairs, the valves naked. Nutlets truncate and sharply 3-angled. — Upright herbs, with cut-lobed leaves, and close whorls of flowers in their axils. (Name from λέων, *a lion*, and οὐρά, *tail*, i. e. *Lion's-tail.*)

1. **L. CARDÌACA,** L. (COMMON MOTHERWORT.) Tall; leaves long-petioled; the lower rounded, palmately lobed; the floral wedge-shaped at the base, 3-cleft, the lobes lanceolate; upper lip of the pale purple corolla bearded. ♃ — Waste places, around dwellings, &c. July – Sept. (Nat. from Eu.)

2. **L. MARRUBIÁSTRUM,** L. Tall, with elongated branches; stem-leaves oblong-ovate, coarsely toothed; corolla (whitish) shorter than the calyx-teeth; the tube naked within; lower lip rather erect. ② — Road-sides, Pennsylvania: rare. (Adv. from Eu.)

31. LÀMIUM, L. Dead-Nettle.

Calyx tubular-bell-shaped, about 5-nerved, with 5 nearly equal awl-pointed teeth. Corolla dilated at the throat; the upper lip ovate or oblong, arched, narrowed at the base; the middle lobe of the spreading lower lip broad, notched at the apex, contracted as if stalked at the base; the lateral ones small, at the margin of the throat. Stamens 4, ascending under the upper lip; anthers approximate in pairs, 2-celled, the cells divergent. Nutlets truncate at the apex. — Herbs, decumbent at the base, the lowest leaves small and long-petioled, the middle ones heart-shaped and doubly toothed, the floral similar but nearly sessile, subtending the axillary whorled clusters of flowers. (Name from λαιμός, *the throat*, in allusion to the ringent corolla.)

1. **L.** AMPLEXICAÙLE, L. Leaves rounded, deeply crenate-toothed or cut, the *upper ones clasping*; corolla (purple) elongated, upper lip bearded, the lower spotted; lateral lobes truncate. ① — Cultivated grounds. (Adv. from Eu.)

2. **L.** PURPÙREUM, L. *Leaves* roundish or oblong, heart-shaped, crenate-toothed, *all petioled.* — Cult. grounds, Pennsylvania. (Adv. from Eu.)

32. BALLÒTA, L. Fetid Horehound.

Calyx nearly funnel-form, the 10-ribbed tube expanded above into a spreading regular border, with 5 – 10 teeth. Anthers exserted beyond the tube of the corolla, approximate in pairs. Otherwise much as in Marrubium. (The Greek name, of uncertain origin.)

1. **B.** NÌGRA, L. (Black Horehound.) More or less hairy, but green, erect; leaves ovate, toothed; whorls many-flowered, dense; calyx-teeth 5, longer than the tube of the purplish corolla. ♃ — Waste places, Massachusetts and Connecticut: scarce. (Adv. from Eu.)

33. PHLÒMIS, L. Jerusalem Sage.

Calyx tubular, 5 – 10-ribbed, truncate or equally 5-toothed. Upper lip of the corolla arched; the lower spreading, 3-cleft. Stamens 4, ascending and approximate in pairs under the upper lip; the filaments of the upper pair with an awl-shaped appendage at the base, *longer than the others* in P. tuberosa, &c.: anther-cells divergent and confluent. — Leaves rugose. Whorls dense and many-flowered, axillary, remote, bracted. (An old Greek name of a woolly species, of obscure derivation.)

1. **P.** TUBERÒSA, L. Tall (3° – 5° high), nearly smooth; leaves ovate-heart-shaped, crenate, petioled; the floral oblong-lanceolate; bracts awl-shaped, hairy; upper lip of the purple corolla densely bearded with white hairs on the inside. ♃ — Shore of Lake Ontario near Rochester, *Prof. Hadley*, *Prof. Dewey*. (Adv. from Eu.)

The familiar cultivated plants of this family, not mentioned above, are the Sweet Basil (*Ocymum Basilicum*); the Lavender (*Lavándula vera*); and the Sweet Marjoram (*Origanum Majoràna*).

ORDER 78. BORRAGINÀCEÆ. (BORAGE FAMILY.)

Chiefly rough-hairy herbs (*not aromatic*), *with alternate entire leaves, and symmetrical flowers with a 5-parted calyx, a regular 5-lobed corolla* (except in No. 1), 5 *stamens inserted on its tube, a single style and a deeply 4-lobed ovary* (*as in* Labiatæ), *which forms in fruit 4 seed-like nutlets, each with a single seed.* — Albumen none. Cotyledons plano-convex: radicle pointing to the apex of the fruit. Stigmas 1 or 2. Calyx valvate, the corolla imbricated (in Myosotis convolute) in the bud. Flowers axillary, or on one side of the branches of a reduced cyme,* which is rolled up from the end, and straightens as the blossoms expand, often bractless. (Innocent, mucilaginous, and slightly bitter plants; the roots of many species yielding a red dye.) A rather large family.

Synopsis.

TRIBE I. **BORRAGEÆ.** Ovary deeply 4-parted, forming as many separate 1-seeded nutlets in fruit; the style rising from the centre between them. (Root frequently red.)

* Corolla naked and open (without scales) in the throat, somewhat irregular! Nutlets fixed by their base (separate from the style); the scar flat.

1. ECHIUM. Corolla funnel-form, unequally 5-lobed. Stamens protruded.

* * Corolla with 5 scales closing the throat Nutlets not prickly, fixed by their base (separate from the style); the scar broad and hollowed out.

2. LYCOPSIS Corolla funnel-form, slightly curved and oblique: scales blunt and hairy.
3. SYMPHYTUM Corolla tubular, and enlarged at the summit: scales awl-shaped.

* * * Corolla naked and open, or with folds rather than scales in the throat, regular. Nutlets not prickly, fixed by their base (separate from the style); the scar very small and flat.

+- Lobes of the tubular corolla imbricated in the bud.

4. ONOSMODIUM. Nutlets stony, smooth. Lobes of the corolla acute and erect.
5. LITHOSPERMUM. Nutlets stony, smooth. Lobes of the corolla spreading, rounded.
6. MERTENSIA. Nutlets rather fleshy, oblique. Lobes of the corolla rounded.

+- +- Lobes of the short salver-shaped corolla convolute in the bud.

7. MYOSOTIS. Nutlets hard and smooth. Flowers all of them, or all but the lowest, bractless.

* * * * Corolla with 5 scales closing the throat. Nutlets prickly, laterally fixed to the central column or the base of the style.

8. ECHINOSPERMUM. Corolla salver-shaped Nutlets erect, prickly on the margin.
9. CYNOGLOSSUM. Corolla funnel-form. Nutlets oblique or depressed, prickly all over.

TRIBE II. **HELIOTROPEÆ.** Ovary not lobed, tipped with the simple style: the fruit separating when ripe into 2 or 4 nutlets

10. HELIOTROPIUM. Throat of the short salver-shaped corolla open. Nutlets 1-celled.
11. HELIOPHYTUM. Throat of the corolla contracted. Nutlets 2, each 2-celled.

1. ÈCHIUM, Tourn. VIPER'S BUGLOSS.

Corolla with a cylindraceous or funnel-form tube, and a more or less unequal spreading 5-lobed border; the lobes rounded, the expanded throat naked. Stamens mostly exserted, unequal. Style thread-form. Nutlets roughened or wrinkled, fixed by a flat base. (A name of Dioscorides, from ἔχις, *a viper*.)

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* In the descriptions we call these clusters *racemes* or *spikes*, for convenience, since they so closely imitate them. But the flowers are not in the axils of the bracts when these are present.

1. **E. vulgàre**, L. (Blue-weed.) Rough-bristly; stem erect (2° high), mostly simple; stem-leaves linear-lanceolate, sessile; flowers showy, in short lateral spikes, disposed in a long and narrow raceme; corolla reddish-purple changing to brilliant blue (rarely pale). ② — Road-sides and meadows: rather rare northward; a troublesome weed in Virginia. June. (Nat. from Eu.)

2. LYCÓPSIS, L. Bugloss.

Corolla funnel-shaped, with a curved tube and a slightly unequal limb; the throat closed with 5 convex obtuse bristly scales placed opposite the lobes. Stamens and style included. Nutlets rough-wrinkled, hollowed out at the base. — Annuals. (Name from λύκος, *a wolf*, and ὄψις, *face*.)

1. **L. arvénsis**, L. (Small Bugloss.) Very rough-bristly (1′ high); leaves lanceolate; flowers in leafy racemes; calyx as long as the tube of the small blue corolla. — Dry or sandy fields, New England to Virginia: scarce. (Adv. from Eu.)

3. SÝMPHYTUM, Tourn. Comfrey.

Corolla oblong-tubular, inflated above, 5-toothed; the short teeth spreading; the throat closed with 5 converging linear-awl-shaped scales. Stamens included: anthers elongated. Style thread-form. Nutlets smooth, ovate, fixed by a large hollowed base. — Coarse perennial herbs, with thickened mucilaginous roots; the nodding racemes either single or in pairs. (Name from συμφεῖν, *to grow together*, probably in allusion to its reputed healing virtues.)

1. **S. officinàle**, L. (Common Comfrey.) Hairy, branched, winged above by the decurrent leaves; the lower ones ovate-lanceolate, tapering into a petiole, the upper narrower; corolla yellowish-white, rarely purplish. — Moist places; sparingly escaped from gardens. June. (Adv. from Eu.)

4. ONOSMÒDIUM, Michx. False Gromwell.

Calyx 5-parted; the divisions linear and erect. Corolla tubular or tubular-funnel-form, naked in the throat (the sinuses minutely hooded-inflexed); the 5 acute lobes converging or somewhat spreading. Anthers oblong-linear or arrow-shaped, mucronate, inserted in the throat of the corolla. Style thread-form, much exserted. Nutlets bony, ovoid, smooth, fixed by the base; the scar minute, not hollowed out. — Chiefly perennial herbs, coarse and hispid, with oblong and sessile ribbed-veined leaves, and white, greenish, or yellowish flowers, in at length elongated and erect leafy racemes. — Our species all belong to Onosmodium Proper, having the anthers all included, smooth, and on very short filaments; the corolla only once or twice the length of the calyx. (Named from the resemblance to the genus *Onosma*.)

1. **O. Virginiànum**, DC. *Clothed all over with harsh and rigid appressed bristles;* stems rather slender (1°–2° high); *leaves narrowly oblong*, or oblong-

lanceolate (1′–2½′ long), the lower narrowed at the base; *corolla rather longer than the calyx* (3″ long); *the lobes lanceolate-awl-shaped*, bearded with long bristles outside; anthers oblong-arrow-shaped, on very short flattened filaments. (O. hispidum, *Michx.* Lithospérmum Virginianum, *L.!*) — Banks and hill-sides, S. New England to Virginia and southward. June–Aug.

2. **O. Caroliniànum,** DC. (excl. syn. *Michx.*) *Clothed all over with long and spreading bristly hairs;* stem stout, upright (3°–4° high); *leaves ovate-lanceolate or oblong-lanceolate*, acute; *corolla twice the length of the calyx; the lobes deltoid-ovate, obtusish;* anthers oblong, longer than the narrow filaments. (O. móllе, *Beck*, &c. Lithosp. Carolinianum, *Lam.*) — River-banks, W. New York, Wisconsin, Virginia, and southward. June, July. — Stouter and larger-leaved than the last, thickly clothed with less rigid but long and *shaggy* whitish hairs. Lobes of the corolla more or less hairy on the back, appearing slightly heart-shaped by the inflexion of the sinuses. This has been confounded by some authors with No. 1; by others with No. 3, which it most resembles.

3. **O. mólle,** Michx. *Hoary with fine and close strictly appressed hairs; leaves oblong-ovate,* obtusish, *soft-downy underneath; corolla longer than the calyx, the lobes lance-ovate or triangular, acute;* anthers linear, much longer than the vertically dilated filaments. — Dry grounds, Illinois and southward. Corolla rather larger than in the last; the lobes more or less hairy along the middle.

5. LITHOSPÉRMUM, Tourn. GROMWELL. PUCCOON.

Corolla funnel-form, or sometimes salver-shaped; the open throat naked, or with a more or less evident transverse fold or scale-like appendage opposite each lobe; the spreading limb 5-cleft; its lobes rounded. Anthers oblong, almost sessile, included. Nutlets ovate, smooth or roughened, mostly bony or stony, fixed by the base; the scar nearly flat. — Herbs, with thickish and commonly red roots, sessile leaves, and axillary or often spiked or racemed leafy-bracted flowers (occasionally of 2 forms as to stamens and style, as in Oldenlandia, p. 171, &c.). (Name compounded of λίθος, *stone*, and σπέρμα, *seed*, from the hard nutlets.)

§ 1. *Nutlets tubercled or rough-wrinkled and pitted, gray and dull: throat of the (nearly white) corolla destitute of evident folds or appendages.*

1. **L. arvénse,** L. (CORN GROMWELL.) Minutely rough-hoary; stems erect (6′–12′ high); leaves lanceolate or linear, veinless; corolla scarcely longer than the calyx. ① — Sandy banks and road-sides, New England to Pennsylvania and Michigan. May–Aug. (Nat. from Eu.)

§ 2. *Nutlets smooth and shining, mostly white like ivory, occasionally dotted with pores: corolla in our species greenish-white or cream-color, small, with 5 small but distinct pubescent scales in the throat.* (*Root perennial.*)

2. **L. angustifòlium,** Michx. Minutely and slightly hoary, roughish, much branched, erect or spreading (6′–15′ high); *leaves linear, rigid,* 1-*nerved; corolla not longer than the calyx;* the short peduncles in fruit mostly recurved; *nutlets more or less pitted* when young, rarely bright white, but smooth and shining. — River-banks, from Illinois southward and westward. May.

3. **L. OFFICINÀLE**, L. (COMMON GROMWELL.) Much branched above, erect (1° – 2° high); *leaves thinnish, broadly lanceolate, acute*, with a few distinct veins, rough above, soft-pubescent beneath; *corolla exceeding the calyx; nutlets very smooth and even.* — Road-sides, &c.: rather rare. (Nat. from Eu.)

4. **L. latifòlium**, Michx. Stem loosely branched, erect (2° – 3° high), rough; *leaves ovate and ovate-lanceolate, mostly taper-pointed* (even the floral ones 2′ – 4′ long), *ribbed-veined*, roughish above, finely soft-pubescent beneath, the root-leaves large and rounded; *corolla shorter than the calyx; nutlets very smooth or sparingly impressed-punctate*, shining, turgid (2″ long). — Borders of woods, Michigan to Kentucky. June.

§ 3. *Nutlets smooth and shining: corolla large, salver-shaped or nearly so, deep orange-yellow, somewhat pubescent outside: the tube 2 – 4 times longer than the calyx, the throat more or less appended.* (*Roots perennial, long and deep, yielding a red dye.*) (Bátschia, *Gmel.*)

* *Tube of the corolla, from one half to twice longer than the calyx, not much longer than its ample limb, the lobes entire; the appendages glandular and adherent* (*especially in the state with the stamens at the base of the tube*), *or slightly arched.*

5. **L. hírtum**, Lehm. (HAIRY PUCCOON.) *Hispid* with bristly hairs (1° – 2° high); stem-leaves lanceolate or linear, those of the flowering branches ovate-oblong, bristly-ciliate; *corolla woolly-bearded at the base inside; flowers distinctly peduncled; fruiting calyx* (⅓′ long) 3 – 4 times longer than the nutlets. (Also L. sericeum, *Lehm.* Batschia Caroliniensis, *Gmel.* B. Gmelini, *Michx.*) — Dry woods, Michigan to Wisconsin, Virginia, and southward and northwestward. April – June. — Flowers crowded, showy: limb of the corolla ¾′ – 1′ broad.

6. **L. canéscens**, Lehm. (HOARY PUCCOON or ALKANET.) *Softly hairy* and more or less *hoary* (6′ – 15′ high); *leaves obtuse*, linear-oblong, or the upper ovate-oblong, more or less *downy beneath* and roughish with close appressed hairs above; *corolla naked at the base within; flowers sessile; fruiting calyx* (3″ long) *barely twice the length of the nutlets.* (Batschia canescens, *Michx.*) — Open woods and plains, W. New York to Kentucky, Wisconsin, and northwestward. May. — Limb of the showy corolla smaller and the calyx shorter than in the last.

* * *Tube of the corolla 2 – 4 times the length of the calyx, and of its erose-toothed or crenulate lobes; the appendages at the throat more projecting or arched.* (Pentálophus, *A. DC.*)

7. **L. longiflòrum**, Spreng. Minutely strigose-hoary; stem simple (6′ – 18′ high); leaves linear; tube of the corolla much longer than the calyx (¾′ – 1½′ long). (Batschia longiflora, *Pursh.* L. incisum, *Lehm.* Pentalophus longiflorus, *A. DC.*) — Prairies and plains, from W. Illinois and Wisconsin westward. May.

6. MERTÉNSIA, Roth. SMOOTH LUNGWORT.

Corolla trumpet-shaped or bell-funnel-shaped, much longer than the deeply 5-cleft or 5-parted calyx, naked, or with 5 small glandular folds or appendages in the open throat; the spreading border 5-lobed. Stamens protruding from the

throat: filaments equalling or longer than the oblong or somewhat arrow-shaped anthers. Style long and thread-form. Nutlets ovoid, fleshy when fresh, smooth or wrinkled, obliquely attached next the base by a prominent internal angle; the scar small. — Smooth! or soft-hairy perennial herbs, with pale and entire leaves, and handsome purplish-blue (rarely white) flowers, in loose and short panicled or corymbed racemes, only the lower ones leafy-bracted: pedicels slender. (Named for *Prof. Mertens*, an early German botanist.)

§ 1. *Corolla perfectly naked in the throat; the broad trumpet-mouthed limb slightly* 5 *lobed: filaments slender, much longer than the anthers.*

1. **M. Virginica,** DC. (VIRGINIAN COWSLIP or LUNGWORT.) Very smooth, pale, erect (1° - 2° high); leaves thin, obovate, veiny, those of the root (4′ - 6′ long) petioled; corolla trumpet-shaped, 1′ long, many times exceeding the calyx, rich purple-blue, rarely white. (Pulmonaria Virginica, *L.*) — Alluvial banks, W. New York to Wisconsin, Virginia, Kentucky, and southward. May. — Cultivated for ornament.

§ 2. *Corolla with* 5 *glandular folds or appendages at the throat; the limb more deeply lobed: filaments shorter and flat.*

2. **M. maritima,** Don. (SEA LUNGWORT.) Spreading or *decumbent*, *smooth*, *glaucous*; *leaves fleshy*, ovate or obovate, the upper surface becoming papillose; corolla bell-funnel-form, twice the length of the calyx (3″ long); *nutlets smooth*, flattened. — Sea-coast, Plymouth, Massachusetts (*Russell*), Maine? and northward. (Eu.)

3. **M. paniculàta,** Don. *Roughish and more or less hairy, erect* (1° - 2° high), loosely branched; *leaves ovate and ovate-lanceolate, taper-pointed, thin*; corolla somewhat funnel-form, 3 - 4 times the length of the hairy calyx (½′ long); *nutlets rough-wrinkled* when dry. (Probably also M. pilosa, *DC.*) — Shore of Lake Superior, and northward.

7. MYOSÒTIS, L. SCORPION-GRASS. FORGET-ME-NOT.

Corolla salver-form, the tube about the length of the 5-toothed or 5-cleft calyx, the throat with 5 small and blunt arching appendages opposite the rounded lobes; the latter convolute in the bud! Stamens included, on very short filaments. Nutlets smooth, compressed, fixed at the base; the scar minute. — Low and mostly soft-hairy herbs, with entire leaves, those of the stem sessile, and with small flowers in naked racemes, which are entirely bractless, or occasionally with one or two small leaves next the base, prolonged and straightened in fruit. (Name composed of *μῦς*, *mouse*, and *οὖς*, *ὠτός*, *ear*, in allusion to the aspect of the short and soft leaves in some species: one popular name is MOUSE-EAR.)

* *Calyx open in fruit, its hairs appressed, none of them hooked nor glandular.*

1. **M. palústris,** With. (TRUE FORGET-ME-NOT.) Stems ascending from an obliquely creeping base (9′ - 20′ high), loosely branched, smoothish; leaves rough-pubescent, oblong-lanceolate or linear-oblong; calyx moderately 5-cleft, shorter than the spreading pedicels; corolla (rather large in the genuine plant) pale blue with a yellow eye. ♃ — Cultivated occasionally. — Varies into

smaller-flowered forms, among which high authorities rank M. cæspitosa, and (with yet more reason) the intermediate

Var. **láxa.** (M. laxa, *Lehm.*) Creeping base of the stem short; flowers ⅓ or ½ smaller; pedicels longer. — Wet places; common, especially northward. May – Aug. (Eu.)

* * *Calyx closing, or the lobes erect in fruit, clothed with spreading hairs, a part of them minutely hooked or glandular at the apex.*

2. **M. arvénsis,** L. Hoffm. Hirsute with spreading hairs, erect or ascending (6′ – 15′ high); leaves oblong-lanceolate, acutish; *racemes naked at the base and stalked;* corolla small, blue (rarely white); *pedicels spreading in fruit and larger than the 5-cleft equal calyx.* ① ② (M. intermedia, *Link.* M. scorpioides, var. arvensis, *L.*) — Fields, &c.; not very common. (Indigenous?) May – Aug. (Eu.)

3. **M. vérna,** Nutt. Bristly-hirsute, branched from the base, erect (4′ – 12′ high); *leaves obtuse,* linear-oblong, or the lower spatulate-oblong; *racemes leafy at the base;* corolla very small and white, with a short limb; *pedicels in fruit erect and appressed* at the base, usually abruptly bent outwards near the apex, *rather shorter than the deeply 5-cleft unequal* (somewhat 2-lipped) very hispid calyx. ① ② (M. inflexa, *Engelm.* M. stricta, *ed.* 1. M. arvensis, *Torr. fl. N. Y.*) — Dry hills, &c., Massachusetts to Wisconsin and southward. May – July.

8. ECHINOSPÉRMUM, Swartz. STICKSEED.

Corolla salver-form, short, nearly as in Myosotis, but imbricated in the bud; the throat closed with 5 short scales. Stamens included. Nutlets erect, fixed laterally to the base of the style or central column, triangular or compressed, the back armed with 1 – 3 marginal rows of prickles which are barbed at the apex, otherwise naked. — Rough-hairy and grayish herbs, with small blue flowers in bracted racemes. (Name compounded of ἐχῖνος, *a hedgehog,* and σπέρμα, *seed,* from the prickly nutlets.)

1. **E.** LÁPPULA, Lehm. Stem upright, branched above (1° – 2° high); the short pedicels erect; leaves lanceolate, rough-hairy; nutlets each with a double row of prickles at the margins, and tubercled on the back. ① ② — Waste places; common. July. (Nat. from Eu.)

9. CYNOGLÓSSUM, Tourn. HOUND'S-TONGUE.

Corolla funnel-form; the tube about the length of the 5-parted calyx; the throat closed with 5 obtuse scales; the lobes rounded. Stamens included. Nutlets depressed or convex, oblique, fixed near the apex to the base of the style, roughened all over with short barbed or hooked prickles. — Coarse herbs, with a strong unpleasant scent, and mostly panicled racemes which are naked above but usually bracted at the base. Lower leaves petioled. (Name from κύων, *a dog,* and γλῶσσα, *tongue;* from the shape and texture of the leaves.)

1. **C.** OFFICINÀLE, L. (COMMON HOUND'S-TONGUE.) *Clothed with short soft hairs, leafy,* panicled above; upper leaves lanceolate, closely sessile by a rounded or slightly heart-shaped base; racemes nearly bractless; *corolla reddish-*

purple (rarely white, *Sartwell*); nutlets flat on the broad upper face, somewhat margined. ② —Waste grounds and pastures: a familiar and troublesome weed; the large nutlets adhering to the fleece of sheep, &c. (Nat. from Eu.)

2. **C. Virginicum,** L. (WILD COMFREY.) *Roughish with spreading bristly hairs;* stem simple, *few-leaved* (2° – 3° high); stem-leaves lanceolate-oblong, clasping by a deep heart-shaped base; *racemes few and corymbed, raised on a long naked peduncle,* bractless; *corolla pale blue;* nutlets strongly convex. ♃ —Rich woods, Vermont to Virginia along the mountains, and westward. June. — Flowers much smaller than in the last, much larger than in the next.

3. **C. Morisòni,** DC. (BEGGAR'S LICE.) Stem hairy, very broadly branched, *leafy* (2° – 4° high); leaves oblong-ovate, taper-pointed, also tapering at the base, thin, minutely downy underneath and roughish above; *racemes panicled,* forking, diverging, hairy, *leafy-bracted* at the base; *corolla white or pale blue* (minute); pedicels reflexed in fruit; nutlets convex, the prickles with barbed points. ② (Myosòtis Virgínica, *L.* Echinospérmum, *Lehm.*) — Copses; common. July. — A vile weed.

10. HELIOTRÒPIUM, Tourn. HELIOTROPE.

Corolla salver-shaped, short, 5-lobed; the sinuses more or less plaited in the bud; the throat open. Anthers nearly sessile. Style short: stigma conical. Nutlets 4, when young united by their whole inner faces into a 4-celled ovary, but separating when ripe, each 1-seeded. — Herbs or low shrubby plants, the small flowers in 1-sided spikes. (The ancient name, from ἥλιος, *the sun,* and τροπή, *a turn.*)

1. **H.** EUROPÆUM, L. Erect (6′ – 18′ high), hoary-pubescent; leaves oval, long-petioled; lateral spikes single, the terminal in pairs; calyx spreading in fruit, hairy. ① — Waste places, Maryland, Virginia, &c. in a few places. (Adv. from Eu.)

H. CURASSÁVICUM, L., has been gathered at Norfolk, Virginia: probably brought in the ballast of vessels. It also grows at St. Louis.

H. PERUVIÀNUM, L., is the well-known SWEET HELIOTROPE in cultivation.

11. HELIÓPHYTUM, (Cham.) DC. INDIAN HELIOTROPE.

Corolla constricted at the throat. Style very short. Nutlets 2, each 2-celled (i. e. 4, in pairs), and sometimes with a pair of empty false cells besides: otherwise nearly as in Heliotropium. (Name composed of ἥλιος, *sun,* and φυτόν, *plant.*)

1. **H.** ÍNDICUM, DC. Erect, hairy; leaves petioled, ovate or oval and somewhat heart-shaped; spikes single; fruit 2-cleft, mitre-shaped, splitting into 2 halves with an empty false cell before each seed-bearing cell, and these at length separable again into 2 one-seeded and 2-celled nutlets. ① (Heliotropium Indicum, *L.*) — Waste places, Illinois, opposite St. Louis, and southward. (Adv. from India.)

BORRÀGO OFFICINÀLIS, L., the cultivated BORAGE, is sometimes spontaneous in gardens.

ORDER 79. HYDROPHYLLÀCEÆ. (WATERLEAF FAM.)

Herbs, commonly hairy, with mostly alternate and cut-lobed leaves, regular 5-merous and 5-androus flowers, in aspect between the foregoing and the next order; but the ovary ovoid and entire, 1-*celled, with* 2 *parietal* 4–*many-ovuled placentæ.* — Style 2-cleft above. Pod globular or oblong, 2-valved, 4–many-seeded. Seeds reticulated or pitted, amphitropous, with a small embryo in cartilaginous albumen. — Flowers chiefly blue or white, in one-sided cymes or racemes, which are mostly coiled from the apex when young, and bractless, as in the Borage Family. (A small order of plants, of no marked properties, some of them cultivated for ornament.)

Synopsis.

* Ovary lined with the broad and fleshy placentæ, which enclose the ovules and seeds (in our plants only 4 in number) like an inner pericarp.

+ Corolla-lobes convolute in the bud.

1. HYDROPHYLLUM. Stamens exserted: anthers linear. Calyx unchanged in fruit.
2. NEMOPHILA. Stamens included: anthers ovoid. Calyx with appendages at the sinuses, somewhat enlarged in fruit.

+ + Corolla-lobes imbricated in the bud.

3. ELLISIA. Stamens included. Calyx destitute of appendages, enlarged in fruit.

* * Ovary with narrow parietal placentæ, in fruit projecting inwards more or less.

4. PHACELIA. Corolla with its lobes imbricated in the bud, deciduous. Calyx destitute of appendages.

1. HYDROPHÝLLUM, L. WATERLEAF.

Calyx 5-parted, sometimes with a small appendage in each sinus, early open in the bud. Corolla bell-shaped, 5-cleft; the lobes convolute in the bud; the tube furnished with 5 longitudinal linear appendages opposite the lobes, which cohere by their middle, while their edges are folded inwards, forming a nectariferous groove. Stamens and style mostly exserted: filaments more or less bearded. Ovary bristly-hairy (as is usual in the family); the 2 fleshy placentæ expanded so as to line the cell and nearly fill the cavity, soon free from the walls except at the top and bottom, each bearing a pair of ovules on the inner face. Pod ripening 1–4 seeds, spherical. — Perennial herbs, with petioled ample leaves, and white or pale blue cymose-clustered flowers. (Name formed of ὕδωρ, *water*, and φύλλον, *leaf;* of no obvious application to these plants.)

* *Calyx naked or occasionally with minute appendages at the sinuses: rootstocks creeping, thickish, scaly-toothed.*

1. **H. macrophýllum,** Nutt. *Rough-hairy; leaves oblong, pinnate, and pinnatifid; the divisions* 9–13, *ovate, obtuse,* coarsely cut-toothed; *peduncle very long;* calyx-lobes lanceolate-pointed from a broad base, very hairy. — Rocky, shaded banks, Ohio, Indiana, Kentucky, and southward. July. — Root-leaves 1° long: cyme globular, crowded

2. **H. Virgínicum,** L. *Smoothish* (1°–2° high); *leaves pinnately divided; the divisions* 5–7, *ovate-lanceolate or oblong, pointed,* sharply cut-toothed,

the lowest mostly 2-parted, the uppermost confluent; *peduncles longer than the petioles* of the upper leaves, forked; calyx-lobes narrowly linear, bristly-ciliate. — Damp rich woods, Maine to Virginia and westward. June. — Peduncles forked: clusters rather dense.

3. **H. Canadénse,** L. *Nearly smooth* (1° high); *leaves palmately* 5-7-*lobed, rounded,* heart-shaped at the base, unequally toothed; those from the root sometimes with 2-3 small and scattered lateral leaflets; *peduncles much shorter than the long petioles,* forked, the crowded (nearly white) flowers on very short pedicels; calyx-lobes linear-awl-shaped, nearly smooth. — Damp rich woods, W. New England to the mountains of Virginia, and northward. June, July. — Rootstocks thickened and very strongly toothed in 2 rows by the persistent bases of the stout petioles: leaves 3′-5′ broad.

* * *Calyx with a small reflexed appendage in each sinus: stamens sometimes not exserted (probably two forms of flowers, as in some Borraginaceæ, p.* 321, *&c.).*

4. **H. appendiculàtum,** Michx. (HAIRY WATERLEAF.) Hairy; stem-leaves palmately 5-lobed, rounded, the lobes toothed and pointed, the lowest pinnately divided; cymes rather loosely flowered; pedicels (at length slender) and calyx bristly-hairy. — Open woods, W. New York to the Alleghanies of Virginia, Wisconsin, and westward. June.

2. NEMÓPHILA, Nutt. NEMOPHILA.

Calyx 5-parted, and with a reflexed tooth or appendage in each sinus, more or less enlarged in fruit. Corolla bell-shaped or almost wheel-shaped; the lobes convolute in the bud; the tube mostly with 10 small folds or scales inside. Stamens included: anthers ovoid or heart-shaped. Placentæ (bearing each 2-12 ovules), pod, and seeds much as in Hydrophyllum; the embryo larger. — Diffuse and fragile annuals, with opposite or partly alternate pinnatifid or lobed leaves, and one-flowered peduncles; the corolla white, blue, or marked with purple. (Name composed of νέμος, *a grove,* and φιλέω, *to love;* from the place of growth they affect.)

1. **N. microcàlyx,** Fisch. & Meyer. Small, roughish-pubescent; stems diffusely spreading (2′-8′ long); leaves parted or deeply cleft into 3-5 roundish or wedge-obovate sparingly cut-lobed divisions, the upper leaves all alternate; peduncles opposite the leaves and shorter than the long petioles; flowers minute; corolla white (1½″ long), longer than the calyx; placentæ each 2-ovuled; pod 1-2-seeded. (Ellisia microcalyx, *Nutt.* Nemophila evanescens, *Darby.*) — Rich moist woods, Virginia (near Washington), and southward. April-June.

N. INSÍGNIS, N. MACULÀTA, &c. are showy Californian species, now common in gardens.

3. ELLÍSIA, L. ELLISIA.

Calyx 5-parted, without appendages, enlarged and foliaceous in fruit. Corolla bell-shaped, not longer than the calyx, 5-lobed above; the lobes imbricated in the bud, the tube with 5 minute appendages within. Stamens included.

Placentæ (each 2-ovuled), fruit, and seeds much as in Hydrophyllum. — Delicate and branching annuals, with lobed or divided leaves, the lower opposite, and small whitish flowers. (Named for *John Ellis*, a distinguished naturalist, long a correspondent of Linnæus.)

1. **E. Nyctèlea,** L. Minutely or sparingly roughish-hairy, divergently branched (6′ – 12′ high); leaves pinnately parted into 7 – 13 lanceolate or linear-oblong sparingly cut-toothed divisions; peduncles solitary in the forks or opposite the leaves, 1-flowered; calyx-lobes triangular, tapering to a sharp point, nearly as long as the peduncle, longer than the whitish corolla, in fruit becoming almost ½′ long. — Shady places, from Pennsylvania (opposite Trenton, New Jersey, *Mr. Laning*) to Virginia, Illinois, and southwestward. May – July.

4. PHACÈLIA, Juss. (Phacelia & Eutoca, *R. Br.*)

Calyx 5-parted; the sinuses naked. Corolla open-bell-shaped, 5-lobed; the lobes imbricated in the bud. Filaments slender, often (with the 2-cleft style) exserted: anthers ovoid or oblong. Ovary with 2 narrow linear placentæ adherent to the walls, in fruit usually projecting inwards more or less, the two often forming an imperfect partition in the ovoid 4 – many-seeded pod. (Ovules 2 – 30 on each placenta.) — Perennial or mostly annual herbs, with either simple, lobed, or divided leaves, and commonly handsome (blue, purple, or white) flowers in one-sided racemes. (Name from φάκελος, *a fascicle;* the flowers or racemes being often clustered.)

§ 1. PHACELIA PROPER. — *Seeds and ovules only* 4 (*two on each placenta*): *corolla with narrow folds, appendages, or scales within; the lobes entire.*

1. **P. bipinnatífida,** Michx. Stem upright, much branched, hairy (1° – 2° high); leaves long-petioled, pinnately 3 – 5-divided; the divisions or leaflets ovate or oblong-ovate, acute, coarsely and often sparingly cut-lobed or pinnatifid; racemes elongated, loosely many-flowered, glandular-pubescent; pedicels about the length of the calyx, spreading or recurved. ♃ ? — Shaded banks, in rich soil, Ohio, Indiana, Kentucky, and southward along the mountains. May, June. — Corolla bright blue, ½′ broad, with 5 pairs of longitudinal folds. Stamens bearded below: these, with the style, are either somewhat included (P. brevístylis, *Buckley*) or exserted in different individuals.

§ 2. COSMÁNTHUS. (Cosmanthus, *Nolte*. Sect. Eucosmanthus, *A. DC.*, in part.) — *Seeds and ovules only* 4: *corolla naked within; its lobes beautifully fringe-toothed: filaments villous-bearded below: leaves pinnatifid, the upper clasping at the base: flowers long-pedicelled.*

2. **P. Púrshii,** Buckley. Sparsely hairy; stem erect or ascending, branched (8′ – 12′ high); *lobes of the stem-leaves* 5 – 9, *oblong or lanceolate, acute; raceme many-flowered; calyx-lobes lance-linear; corolla blue* (about ½′ in diameter). ① (P. fimbriata, *Pursh.*, not of *Michx.* Cosmanthus fimbriatus, *Nolte, &c.*) — Moist wooded banks, W. Penn. to Illinois and southward. April – June.

3. **P. fimbriàta,** Michx. Slightly hairy, slender; stems spreading or ascending (5′ – 8′ long), few-leaved; lowest leaves 3 – 5-divided into roundish

leaflets; the upper 5–7-cleft or cut-toothed, the *lobes obtuse; raceme 3–10-flowered; calyx-lobes linear-oblong, obtuse,* becoming spatulate; *corolla white* (¼'–½' broad). ① — Woods, high mountains of Virginia, and southward. May.

§ 3. EÙTOCA. (Eutoca, *R. Br.*) — *Seeds (or at least the ovules) several or many, rarely only 3 or 4 on each placenta: corolla usually with small and inconspicuous folds or appendages within, its lobes entire.*

4. **P. parviflòra,** Pursh. Somewhat hairy, slender, *diffusely spreading* (3'–8' high); leaves pinnately cleft or the lower divided into 3–7 short lobes; *racemes solitary, loosely* 5–15-*flowered; pedicels filiform,* at length several times longer than the oblong calyx-lobes; corolla bluish or white (¼'–½' broad); *pod few-seeded.* ① — Shaded banks, Penn. to Virginia and southward. April–June.

5. **P. Franklinii.** Soft-hairy; *stem erect* (6'–15' high), rather stout; leaves pinnately parted into many lanceolate or oblong-linear lobes, which are crowded and often cut-toothed or pinnatifid; *racemes short, dense, crowded into an oblong spike;* calyx-lobes linear: corolla blue; *pod many-seeded.* ① (Eutoca Franklinii, *R. Br.*) — Shore of Lake Superior (*Prof. Joy, &c.*); thence northward and westward.

ORDER 80. POLEMONIÀCEÆ. (POLEMONIUM FAMILY.)

Herbs, with alternate or opposite leaves, regular 5-merous and 5-androus flowers, the lobes of the corolla convolute (in one tribe imbricated) in the bud, a 3-celled ovary and 3-lobed style; the pod 3-celled, 3-valved, loculicidal, few–many-seeded; the valves usually breaking away from the triangular central column. — Seeds amphitropous, the coat frequently mucilaginous when moistened and emitting spiral threads. Embryo straight in the axis of copious albumen. Calyx persistent, imbricated in the bud. Corolla with a 5-parted border. Anthers introrse. Flowers cymose-panicled. (Insipid and innocent plants; many are ornamental in cultivation.)

TRIBE I. **POLEMONIEÆ.** Calyx 5-cleft. Corolla with the lobes convolute in the bud. Filaments filiform, inserted on the tube of the corolla: cells of the anther parallel, opening lengthwise.

1. POLEMONIUM. Calyx and corolla open-bell-shaped. Filaments slender, equal.
2. PHLOX. Calyx narrow. Corolla salver-shaped, with a long tube, including the unequally inserted filaments.

TRIBE II. **DIAPENSIEÆ.** Calyx of 5 sepals. Corolla with the lobes imbricated in the bud, and with the broad and flat filaments in the sinuses. Anthers with the cells opening transversely.

3. DIAPENSIA. Anther-cells pointless, opening by an obliquely transverse line.
4. PYXIDANTHERA. Anther-cells awn-pointed underneath, opening straight across.

1. POLEMÒNIUM, Tourn. GREEK VALERIAN.

Calyx bell-shaped. Stamens equally inserted at the summit of the very short tube of the open-bell-shaped corolla; filaments slender, declined, hairy-appendaged at the base. Pod few–several-seeded. — Low, branching herbs, with alternate pinnate leaves, the upper leaflets sometimes confluent; the (blue or white) corymbose flowers nearly bractless. (An ancient name, from πόλεμος, *war*, of doubtful application.)

1. **P. réptans,** L. (Jacob's Ladder.) Smooth, weak, diffusely branched (6′-10′ high); leaflets 7-11, ovate-lanceolate or oblong; corymbs few-flowered; flowers (blue) nodding; calyx-lobes acute; pods about 3-seeded. ♃ — Shady river-banks, W. New York to Wisconsin and southward. May. — Smaller and much fewer-flowered than the P. cærŭleum, which is common in gardens.

2. PHLOX, L. Phlox.

Calyx narrow, somewhat prismatic, or plaited and angled. Corolla salver-form, with a long tube. Stamens very unequally inserted in the tube of the corolla, included. Pod ovoid, with a single seed in each cell. — Chiefly perennials, with opposite and sessile perfectly entire leaves, the floral often alternate. Flowers cymose, mostly bracted; the open clusters terminal or crowded in the upper axils. (Φλόξ, *flame*, an ancient name of Lychnis, transferred to this North American genus.)

* *Stem strictly upright: panicle pyramidal or oblong, many-flowered: peduncles and pedicels very short: lobes of the corolla entire.*

1. **P. paniculàta,** L. Stem stout (2°-4° high), smooth; leaves oblong-lanceolate and ovate-lanceolate, pointed, large, tapering at the base, the upper often heart-shaped at the base; *panicle ample, pyramidal-corymbed; calyx-teeth awn-pointed.* (P. undulata, *Ait.*, &c.) — Var. acuminàta (P. acuminata, *Pursh*) has the broader and taper-pointed leaves beneath downy, like the stem, which is also sometimes rough-hairy and occasionally spotted below. — Rich woods, from Penn. to Illinois, and southward. June, July. — Common in gardens. Flowers pink-purple, varying to white.

2. **P. maculàta,** L. (Wild Sweet-William.) Smooth, or barely roughish; *stem spotted with purple,* rather slender (1°-2° high); lower leaves lanceolate, the upper nearly ovate-lanceolate, tapering to the apex from the broad and rounded or somewhat heart-shaped base; *panicle narrow, oblong,* leafy below; *calyx-teeth triangular-lanceolate, short, scarcely pointed;* corolla purple (sometimes white, when it is P. suavèolens, *Ait.*). Lower branches of the panicle rarely elongated, so as to become pyramidal, when it is P. pyramidàlis, *Smith.* — Rich woods and river-banks, common from N. Penn. to Michigan, Kentucky, and southward: very common in gardens. June.

* * *Stems ascending or upright, often from a decumbent base; flowers in terminal corymbed cymes: the whole plant smooth and glabrous: lobes of the corolla round and entire: calyx-teeth short, triangular-lanceolate.*

3. **P. Carolìna,** L. Stems ascending (½°-2° high), often from a prostrate base; *leaves oblong-lanceolate, or the upper ovate-lanceolate,* and sometimes heart-shaped at the base, acute or pointed; flowers crowded, short-peduncled; *calyx-teeth acute.* — Var. ovàta, *Benth.*, has broad leaves (P. ovata, *L*). Var. nítida, *Benth.*, has narrower leaves (P. nitida, *Pursh.*), and verges to the next. — Woods, W. Penn. to Michigan, Virginia, and southward. June, July. — Corolla 1′ long; the limb 1′ broad, pink-purple.

4. **P. glabérrima,** L. Stems slender, erect (1°–3° high); *leaves linear-lanceolate or rarely oblong-lanceolate,* very smooth (except the rough and sometimes revolute margins), tapering gradually to a point (3′–4′ long); cymes few-flowered and loosely corymbed; flowers peduncled (pink or whitish); *calyx-teeth sharp-pointed.* (P. carnea, *Sims.* P. revoluta, *Aikin.*)—Prairies and open woods, Ohio and Wisconsin to Virginia and southward. July.

* * * *Stems ascending (or in No. 5 often erect) from a spreading or prostrate base, more or less clammy-pubescent, as well as the calyx and the oblong, lanceolate, or linear leaves: flowers in terminal corymbed cymes, mostly peduncled: calyx deeply cleft, the teeth linear-awl-shaped or setaceous.*

5. **P. pilòsa,** L. Stems slender, nearly erect (1°–1½° high), usually hairy, as are the *lanceolate or lance-linear leaves,* which commonly *taper to a sharp point*; cymes at length open; *calyx-teeth slender awl-shaped and awn-like,* longer than the tube; lobes of the pink or rose-red corolla obovate, entire. (P. aristata, *Michx.* P. aristata & pilosa in part, *Benth. in DC.*)—Borders of thickets and prairies, New Jersey to Wisconsin and southward. May, June.—Leaves 1′–2′ long, 1½″–3″ wide.

Var.? **Wálteri.** Stems ascending (½°–1½° high), mostly simple; *leaves broadly linear, lanceolate or ovate-oblong,* abruptly acute or blunt (1′–1½′ long, on sterile shoots often ovate); *cyme compact and sessile, leafy-bracted;* calyx-teeth rather shorter and broader; corolla purple. (P. pilosa, *Walt., Michx., Ell., Benth.* in part, not of *L.*)—Barrens of Kentucky (*Short*), Virginia, and southward. May.—Ordinarily this appears quite distinct from the Linnæan P. pilosa, which is the P. aristata of Michaux.

6. **P. réptans,** Michx. *Runners creeping,* bearing *roundish-obovate* smoothish and thickish leaves; flowering stems (4′–8′ high) and their *oblong or ovate obtuse leaves* (½′ long), *clammy-pubescent;* cyme close, few-flowered; calyx-teeth awl-shaped-linear, acutish, about the length of the tube; *lobes of the reddish-purple corolla round-obovate, entire.*—Damp woods, Penn., Kentucky, and southward: also cultivated. May, June.—Flowers showy: tube of the corolla 1′ long; limb 1′ broad.

7. **P. divaricàta,** L. Stems spreading or ascending from a decumbent base (9′–18′ high); *leaves oblong-ovate* or the lower oblong-lanceolate (1½′ long), acutish; cyme corymbose-panicled, spreading, loosely-flowered; peduncles slender; calyx-teeth slender awl-shaped, much longer than the tube; *lobes of the pale lilac or bluish corolla obcordate or wedge-obovate and notched* at the end, or *often entire* (var. Laphamii, *Wood*), ½′–¾′ long, equalling or longer than the tube, with rather wide sinuses between them.—Rocky damp woods, mountains of Virginia to N. New York, Wisconsin, and northward. May.

8. **P. bífida,** Beck. Stems ascending, branched (5′–8′ high); *leaves linear,* becoming nearly glabrous (½′–1½′ long, 1½″ wide); flowers few, on slender peduncles; calyx-teeth awl-shaped, about the length of the tube; *lobes of the pale purple corolla 2-cleft to or below the middle* (½′ long), equalling the tube, the *divisions linear-oblong.*—Prairies of Illinois, *Mead* (and Missouri). May.

* * * * *Stems creeping and tufted in broad mats, the short flowering shoots ascending glandular-pubescent; the rigid narrow leaves crowded and fascicled.*

9. **P. subulàta,** L. (GROUND or MOSS PINK.) Depressed; leaves awl-shaped, lanceolate, or narrowly linear (¼'-½' long); cymes few-flowered; calyx-teeth awl-shaped, rigid; corolla pink-purple or rose-color with a darker centre (sometimes white), the lobes wedge-shaped, notched, rarely entire. (P. setàcea, *L.*) Dry rocky hills and sandy banks, S. New York to Michigan and southward. April, May. — Commonly cultivated; the broad matted tufts very handsome in blossom.

P. DRUMMÓNDII, Hook., a showy annual from Texas, is now common in gardens.

3. DIAPÉNSIA, L. DIAPENSIA.

Calyx of 5 concave imbricated sepals. Corolla bell-shaped, 5-lobed; the lobes rounded. Filaments broad and flat, adherent to the corolla up to the sinuses, short: anthers adnate, of 2 ovoid pointless cells, diverging below, each opening therefore by a transverse-descending line. Pod enclosed in the calyx, cartilaginous; the cells few-seeded. — An alpine dwarf evergreen, growing in very dense convex tufts, with the stems imbricated below with cartilaginous narrowly spatulate mostly opposite leaves, terminated by a nearly naked scape-like 1-flowered peduncle, 3-bracted under the calyx. Corolla white (½' wide). (The ancient Greek name of the Sanicle, of obscure meaning, strangely applied by Linnæus to this plant.)

1. **D. Lappónica,** L. — Alpine summits of the White Mountains, New Hampshire, and Adirondack Mountains, N. New York. July. (Eu.)

4. PYXIDANTHÈRA, Michx. PYXIDANTHERA.

Anther-cells awn-pointed at the base, opening by a strictly transverse line. Otherwise much as in Diapensia. — A small prostrate and creeping evergreen, with narrowly oblanceolate and awl-pointed crowded leaves, which are mostly alternate on the sterile branches, and somewhat hairy near the base. Flowers solitary and sessile, very numerous, white or rose-color. (Name from πυξίς, *a small box*, and ἀνθήρα, *anther*, the anther opening as if by a lid.)

1. **P. barbulàta,** Michx. — Sandy pine barrens of New Jersey, and southward. April, May.

ORDER 81. CONVOLVULÀCEÆ. (CONVOLVULUS FAM.)

Chiefly twining or trailing herbs, often with some milky juice, with alternate leaves (or scales) and regular 5-androus flowers; a calyx of 5 imbricated sepals; a 5-plaited or 5-lobed corolla convolute or twisted in the bud; a 2-celled (rarely 3-celled) ovary, or in one tribe 2 separate pistils, with a pair of erect ovules in each cell, the cells sometimes doubled by a false partition between the seeds, so becoming 4-celled; the embryo large, curved or coiled in mucilaginous albumen. — Fruit a globular 2-6-seeded pod. Flowers mostly showy: pedicels articulated, often 2-bracted. (Many are cultivated for ornament, and one, the Sweet Potato, for its edible farinaceous roots: those of several species are cathartic; e. g. Jalap.) — There are three suborders, or rather strongly marked tribes.

Synopsis.

TRIBE I. **CONVOLVULEÆ.** Embryo with broad and foliaceous cotyledons crumpled in the seed. Ovary 2-3- (or falsely 4-) celled. Pod usually septifragal — Leafy plants.

* Style 1, undivided.

+ Calyx naked, i. e. not enclosed or surrounded by bracts.

1. QUAMOCLIT. Stamens exserted. Corolla cylindrical-tubular, with a spreading border. Stigma capitate-2-lobed. Pod 4-celled; the cells 1-seeded.
2. IPOMŒA. Stamens included. Corolla funnel-form or bell-shaped. Stigma capitate, often 2-3-lobed. Pod 2-3-celled; cells 2-seeded.
3. CONVOLVULUS. Stigmas 2, elongated, linear. Otherwise much as in No. 2.

+ + Calyx surrounded by 2 broad bracts

4. CALYSTEGIA. Stigmas 2, linear or oblong. Pod imperfectly 2-celled, 4-seeded.

* * Style 2-cleft, or styles 2, rarely 3.

5. STYLISMA. Styles or their divisions simple: stigma depressed-capitate.

TRIBE II. **DICHONDREÆ.** Pistils 2, separate. Otherwise nearly as Tribe I.

6. DICHONDRA. Corolla bell-shaped. Pods 2, each 1-seeded.

TRIBE III. **CUSCUTINEÆ.** Embryo spiral, slender, destitute of cotyledons. Ovary 2-celled. — Leafless parasitic twiners.

7. CUSCUTA. The only genus of the group.

1. QUÁMOCLIT, Tourn. CYPRESS-VINE.

Sepals mostly mucronate or awned. Corolla cylindrical-tubular, with a small spreading border. Stamens and style protruded. Stigma capitate-2-lobed. Pod 4-celled; the cells 1-seeded. — Annual twiners, with red or crimson flowers. (An aboriginal, probably Mexican, name.)

1. **Q.** COCCÍNEA, Mœnch. Leaves heart-shaped, acuminate, entire, or angled; sepals awn-pointed; corolla light scarlet (1′ long). (Ipomœa coccinea, *L.*) — River-banks, &c., Ohio, Virginia, and southward. (Nat. from Trop. Amer. or Ind.)

Q. VULGÀRIS, the cultivated CYPRESS-VINE, is becoming spontaneous in the South.

2. IPOMŒA, L. MORNING-GLORY.

Calyx naked at the base. Corolla bell-shaped, funnel-form, &c. Stamens included. Stigma capitate, often 2-3-lobed. Pod 2-celled, or in one group 3-celled; the cells 2-seeded. (Name, ex L. from ἴψ, ἰπός, *a Bindweed* [which it is not], and ὅμοιος, *like.*)

§ 1. PHÁRBITIS, Choisy. — *Pod* 3- (*rarely* 4-) *celled; the cells* 2-*seeded.*

1. **I.** PURPÙREA, Lam. (COMMON MORNING-GLORY.) Stems retrorsely hairy; *leaves heart-shaped, acuminate, entire;* peduncles long umbellately 3-5-flowered; calyx bristly-hairy below; corolla funnel-form (2 long), purple vary-

ing to white. ① (Convolvulus purpureus, *L.* Pharbitis hispida, *Choisy.*) — Around dwellings, escaping from cultivation. (Adv. from Trop. Amer.)

2. **I.** Nil, Roth. (Morning-Glory.) Stems retrorsely hairy; *leaves heart-shaped, 3-lobed,* the lobes acute or acuminate; peduncles short, or rather long, 1–3-flowered; calyx densely hairy below; corolla white and purple or pale blue. ① (Conv. Nil. & C. hederàceus, *L.*) — Banks and near dwellings, from Maryland southward. (Adv. from Trop. Amer.?)

§ 2. IPOMŒA, Choisy. — *Pod 2-celled; the cells 2-seeded.*

3. **I. lacunòsa,** L. Rather smooth; stem twining and creeping, slender; leaves heart-shaped, pointed, entire or angled-lobed, long-petioled; *peduncles short,* 1–3-flowered; *sepals lance-oblong, pointed, bristly-ciliate* or hairy, half the length of the sharply 5-lobed (white) corolla; pod sparingly hairy. ① (C. micránthus, *Riddell.*) — Woods and fields, Ohio to Illinois, Virginia, and southward. Aug. — Corolla ½′ – ¾′ long.

4. **I. panduràta,** Meyer. (Wild Potato-vine. Man-of-the-Earth.) Smooth or nearly so when old, trailing or sometimes twining; leaves regularly heart-shaped, pointed, occasionally some of them contracted at the sides so as to be fiddle-shaped; *peduncles longer than the petioles;* 1–5-flowered; *sepals smooth, ovate-oblong, very obtuse;* corolla open-funnel-form (3′ long), white with purple in the tube. ♃ — Sandy fields and dry banks, from Connecticut to Illinois and southward. June–Aug. — Stems long and stout, from a huge thick root, which often weighs 10–20 pounds. Flowers opening in bright sunshine.

I. sagittàta (Conv. sagittifolius, *Michx.*) is said by Pursh to grow in Virginia; but it has not lately been met with so far north. — I. commutàta, *Rœm. & Sch.* (I. tricocarpa, *Ell.*), with purple flowers larger than those of No. 3, is likely to occur in S. Virginia and Kentucky.

Batàtas édulis, Choisy (Conv. Batatas, *L.*), is the cultivated Sweet Potato.

3. CONVÓLVULUS, L. Bindweed.

Calyx naked at the base. Corolla mostly bell-shaped. Stamens included. Style 1: stigmas 2, linear, often revolute. Pod 2-celled; the cells 2-seeded. — Stems twining, procumbent, or often erect-spreading. Flowers mostly opening at dawn. (Name from *convolvo,* to entwine.)

1. **C.** arvénsis, L. (Bindweed.) Stem procumbent or twining, and low; leaves ovate-oblong, arrow-shaped, with the lobes at the base acute; peduncles mostly 1-flowered; bracts minute, remote; corolla (¾′ long) white or tinged with reddish. ♃ — Fields, near the coast: likely to become a troublesome weed. June. (Nat. from Eu.)

4. CALYSTÈGIA, R. Br. Bracted Bindweed.

Calyx enclosed in 2 large and mostly heart-shaped leafy bracts: sepals equal. Corolla bell-funnel-form, the border obscurely 5-lobed or entire. Stamens included. Style 1: stigmas 2, linear or oblong. Pod imperfectly 2-celled or 1-celled, 4-seeded. — Perennials, with heart-shaped or arrow-shaped leaves, and axillary 1-flowered peduncles. (Name from κάλυξ, *calyx*, and στέγω, *to cover*, alluding to the bracts enclosing the calyx.)

1. **C. sèpium,** R. Br. (Hedge Bindweed.) *Smooth; stem twining;* leaves broadly arrow-shaped or triangular-halberd-form, pointed, the lobes at the base obliquely truncate and often somewhat toothed; peduncles 4-angled; corolla white, or rose-color (1½′-2′ long). (Convolvulus sepium, *L.*) — Var. rèpens (Convolvulus repens, *L.*) is more or less prostrate, the flowers tinged with pink; a form growing on gravelly shores. — Moist grounds; common. June, July. (Eu.)

2. **C. spithamæ̀a,** Pursh. (Low Bindweed.) *Downy; stem low and mostly simple, upright or ascending* (6′-12′ long); leaves oblong, with a more or less heart-shaped or auricled base, obtuse or pointed at the apex; peduncles usually longer than the leaf; corolla white (2′ long). Open sandy woods and plains, Maine to Wisconsin and southward. July.

5. STYLÍSMA, Raf. Stylisma.

Styles 2 (rarely 3), distinct and simple, or united to above the middle: stigmas (small) depressed-capitate. Otherwise as in Convolvulus and Evolvulus. — Stems slender, branched, prostrate or spreading. Corolla white, somewhat downy outside. (Name compounded of στῦλος, *style*, and ἴσμα, *foundation*; perhaps because the style is divided to the base in the original species.)

1. **S. evolvuloìdes,** Choisy. Soft-pubescent; leaves linear, lanceolate, or oblong, obtuse at both ends or obscurely heart-shaped at the base (¾′-1½′ long), short-petioled; peduncles 1-5-flowered; *bracts awl-shaped, shorter than the pedicels; styles distinct* or nearly so. ♃ (Convolvulus aquaticus, *Walt.* C. trichosanthes, *Michx.* C. tenellus, *Lam.*, *&c.*) — Sandy woods, Ohio, *Riddell* (?), Virginia, and southward. June-Sept. — Corolla 5″-8″ long.

2. **S. Pickeríngii.** Soft and loosely pubescent; leaves narrowly linear, narrowed at the base, scarcely petioled; peduncles mostly 1-flowered; *bracts resembling the leaves, equalling the flower; styles united to far above the middle.* ♃ (Convolvulus Pickeringii, *Torr.*) — Sandy pine barrens, New Jersey (and N. Carolina). July-Sept. — Stems prostrate, 2°-3° long. Corolla 3″-5″ long.

6. DICHÓNDRA, Forst. Dichondra.

Calyx 5-parted. Corolla broadly bell-shaped, 5-cleft. Stamens included. Styles, ovaries, and the utricular 1-2-seeded pods 2, distinct. Stigmas thick. — Small creeping perennial herbs, soft-pubescent, with kidney-shaped entire leaves, and axillary 1-flowered bractless peduncles. Corolla small, yellowish or white. (Name composed of δὶς, *double*, and χόνδρος, *grain*, or *roundish mass*; from the fruit.)

1. **D. rèpens,** Forst.: var. **Carolinénsis,** Choisy. Leaves round-kidney-shaped, pubescent, green both sides; corolla not exceeding the calyx (1″-2½″ long). (D. Carolinensis, *Michx.*) — Moist ground, Virginia, near Norfolk, and southward. (Widely diffused in the Southern hemisphere.)

7. CÚSCUTA, Tourn. DODDER.

Calyx 5- (rarely 4-) cleft, or of 5 sepals. Corolla globular-urn-shaped, bell-shaped, or somewhat tubular, the spreading border 5- (rarely 4-) cleft. Stamens furnished with a scale-like often fringed appendage at their base. Ovary 2-celled, 4-ovuled: styles distinct, or rarely united. Pod mostly 4-seeded. Embryo thread-shaped, spirally coiled in the rather fleshy albumen, destitute of cotyledons! sometimes with a few alternate scales (belonging to the plumule?): germination occurring in the soil. — Leafless herbs, chiefly annuals, yellowish or reddish in color, with thread-like stems, bearing a few minute scales in place of leaves; on rising from the ground becoming entirely parasitic on the bark of herbs and shrubs over which they twine, and to which they adhere by means of papillæ developed on the surface in contact. Flowers small, cymose-clustered, mostly white. (Name of uncertain, supposed to be of Arabic, derivation.)

The following account of our species is contributed by DR. ENGELMANN.

§ 1. *Stigmas elongated: pod opening regularly around the base by circumcissile dehiscence, leaving the partition behind.* (*Natives of the Old World.*)

1. **C. Epilìnum**, Weihe. (FLAX DODDER.) Stems very slender; flowers sessile in dense scattered heads; corolla globular, 5-parted, cylindrical, scarcely exceeding the broadly ovate acute divisions of the calyx, left surrounding the pod in fruit; stamens shorter than the limb; scales short, broad, crenulate, shorter than the globose ovary. — In Flax-fields, where it is sometimes very injurious: sparingly introduced with flax-seed into the Northern States. June. (Adv. from Eu.)

§ 2. *Stigmas capitate: pods indehiscent, rarely bursting irregularly.*

* *Flowers more or less pedicelled: bracts few and distant: calyx 4 – 5-cleft.*

+ *Corolla cylindrical, in fruit covering the top of the pod.*

2. **C. tenuiflòra**, Engelm. Much branched, twining high, pale-colored, flowers at length peduncled and in rather loose cymes; *tube of the corolla* (ventricose after flowering) *twice the length of the obtuse spreading lobes* and of the ovate obtuse calyx-lobes; scales ovate, cut-fringed; stamens shorter than the lobes of the corolla; pod depressed, membranaceous, thin, yellowish. (C. Cephalánthi, *Engelm.*) — Swamps, Illinois and westward; on Cephalanthus and various tall herbs. — Flower the narrowest of all our Northern species.

3. **C. umbròsa**, Beyrich. Flowers peduncled in umbel-like cymes; *tube of the* (mostly 4-cleft) *fleshy corolla as long as the ovate acutish and minutely crenate erect inflexed lobes* and the acute keeled calyx-lobes; *scales minute and few-toothed,* appressed; pod depressed, somewhat umbonate, of a thicker texture, brown, covered or surrounded with the remains of the corolla. (C. Córyli, *Engelm.*) — Prairies and barrens, in rather dry soil, on Hazels, Ceanothus, and other shrubs or herbs; from W. Virginia and Illinois southward and westward.

+ + *Corolla bell-shaped, persistent at the base of the ripe pod.*

4. **C. arvénsis**, Beyrich (in herb. Berlin). Low; flowers small, 5-parted, peduncled in loose umbel-like cymes; tube of the corolla included in or little exceeding the broad-lobed calyx, shorter than its lanceolate acuminate

spreading or reflexed lobes; stamens much shorter than the lobes of the corolla; scales ovate, fimbriate, converging and often exceeding the tube; pod globose, thin, yellowish. (C. pentágona, *Engelm.*) — In fields, prairies, and barrens, from Virginia southward and westward to Illinois and Missouri; on smaller herbs, and flowering (in June and July) earlier than any other of our species. — Stems low, scarcely over a foot high; flowers smaller than in any of our species, and quite variable: when with a large 5-angled calyx it is C. pentagona (Virginia): with a small one, it is var. microcàlyx (Illinois): with a large and hemispherical one, var. calycìna (Texas): with a fleshy verrucose calyx, it is C. verrucòsa, *Engelm.* (Texas).

5. **C. chlorocárpa,** Engelm. Low, orange-colored; flowers mostly 4-cleft, short-pedicelled, in scattered clusters; corolla open bell-shaped, the tube nearly the length of the acute lobes and calyx-teeth; stamens as long as the lobes; scales small, appressed, incised; the thick styles as long as the large depressed ovary; pod depressed, thin, yellowish. (C. Polygonòrum, *Engelm.*) — Low grounds on Polygonum and other herbs, in the Western States. — Flowers much larger than in any of the preceding species; the ovary usually protruding from the tube of the corolla.

6. **C. Gronòvii,** Willd. Stems coarse, climbing high; flowers mostly 5-cleft, peduncled, in close or mostly open paniculate cymes; corolla bell-shaped, the tube longer than (or sometimes only as long as) the ovate obtuse entire spreading lobes; scales large, converging, copiously fringed, confluent at the base; pod globose, umbonate, brown. (C. Americàna, *Pursh*, &c. C. vulgivàga, *Engelm.* C. umbròsa, *Torr.*) — Low, damp grounds, especially in shady places; everywhere common both east and west, and the only species northward and eastward: chiefly on coarser herbs, also on Rubus, Cephalanthus, and other shrubs. Aug. - Oct. — The close-flowered forms occur in the Northeastern States; the loosely-flowered ones westward and southward; a form with 4-parted flowers was collected in Connecticut. C. Saurùri, *Engelm.*, is a form with more open flowers, of a finer texture, in the Mississippi valley.

7. **C. rostràta,** Shuttleworth. Stems coarse, climbing high; flowers (large) 5-parted, peduncled, in umbel-like cymes; corolla deep bell-shaped, the tube twice as long as the ovate obtuse teeth of the calyx and its ovate obtuse entire spreading lobes; the large scales fimbriate, confluent at the base; styles slender, as long as the acute ovary; the large pod pointed. — Shady moist valleys of the Alleghanies, from Maryland and Virginia southward; on tall herbs, rarely on shrubs. The flowers (2″ - 3″ long) and fruit larger than in any other of our species.

* * *Flowers sessile in compact and mostly continuous clusters: calyx of* 5 *separate sepals surrounded by numerous similar bracts; remains of the corolla borne on the top of the globose somewhat pointed pod.* (Lepidánche, *Engelm.*)

8. **C. compácta,** Juss. Stems coarse; *bracts* (3 - 5) *and sepals orbicular, concave, slightly crenate, appressed,* nearly equalling or much shorter than the cylindrical tube of the corolla; stamens shorter than the oblong obtuse spreading lobes of the latter; scales pinnatifid-fringed, convergent, confluent at the base. C. coronata, *Beyrich.*, (C. compacta, *Choisy,*) is the Eastern and Southern form

with a smaller, slenderer, more exserted corolla; C. (Lepidanche) adpressa, *Engelm.*, is the Western form, with a larger, shorter, nearly included corolla. Both grow almost entirely on shrubs; the first in the Alleghanies, from Pennsylvania southward; the latter from Western Virginia to the Mississippi and Missouri, in fertile shady bottoms. The clusters in fruit are sometimes 2′ in diameter.

9. **C. glomeràta,** Choisy. Flowers very densely clustered, forming knotty masses closely encircling the stem of the foster plant, much imbricated with scarious oblong *bracts with recurved-spreading tips; sepals nearly similar,* shorter than the oblong-cylindrical tube of the corolla; stamens nearly as long as the oblong-lanceolate obtuse spreading or reflexed lobes of the corolla; scales large, fringed-pinnatifid; styles slender, longer than the pointed ovary; the pointed pod mostly 1 – 2-seeded. (Lepidanche Compositarum, *Engelm.*) — Moist prairies, from Ohio and Michigan southwestward: growing mostly on tall Compositæ. — The orange-colored stems soon disappear, leaving only the close coils of flowers, appearing like whitish ropes twisted around the stems.

ORDER 82. SOLANÀCEÆ. (NIGHTSHADE FAMILY.)

Herbs (or rarely shrubs), with a colorless juice and alternate leaves, regular 5-merous and 5-androus flowers, on bractless pedicels; the corolla plaited-imbricate, plaited-convolute, or infolded-valvate in the bud, and the fruit a 2-celled (rarely 3 – 5-celled) many-seeded pod or berry. — Seeds campylotropous or amphitropous. Embryo mostly slender and curved in fleshy albumen. Calyx usually persistent. Stamens mostly equal, inserted on the corolla. Style and stigma single. Placentæ in the axis, often projecting far into the cells. (Foliage and usually the fruits more or less narcotic, often very poisonous.) — A large family in the tropics, but very few indigenous in our district. It shades off into Scrophulariaceæ, from which the plaited regular corolla and 5 equal stamens generally distinguish it.

Synopsis.

* Corolla wheel-shaped, 5-parted or cleft; the lobes valvate with the margins turned inwards in the bud. Anthers connivent. Fruit a berry.

1. SOLANUM Anthers opening by pores or chinks at the tip.

* * Corolla bell-shaped or bell-funnel-form, somewhat 5-lobed or entire, plaited in the bud. Anthers separate. Calyx enlarged and bladdery in fruit, enclosing the berry.

2. PHYSALIS. Calyx 5-cleft. Berry juicy, 2-celled.
3. NICANDRA. Calyx 5-parted. Corolla nearly entire. Berry dry, 3 - 5-celled.

* * * Corolla funnel-form or tubular, the spreading border 5-lobed or toothed, plaited in the bud. Anthers separate Fruit a dry pod.

+- Pod enclosed in the urn-shaped calyx, opening by a lid.

4. HYOSCYAMUS. Corolla with a short tube, the border somewhat unequal.

+- +- Pod opening lengthwise. Corolla elongated.

5. DATURA. Calyx prismatic, 5-toothed. Pod prickly, more or less 4-celled, naked.
6. NICOTIANA. Calyx tubular-bell-shaped, 5-cleft. Pod smooth, enclosed in the calyx, 2-celled.

1. SOLÀNUM, L. Nightshade.

Calyx and the wheel-shaped corolla 5-parted or 5-cleft (rarely 4-10-parted), the latter plaited in the bud, with the margins of the lobes induplicate. Stamens exserted, converging around the style: filaments very short: anthers opening at the tip by two pores or chinks. Berry usually 2-celled. — Herbs, or shrubs in warm climates, the larger leaves often accompanied by a smaller lateral (rameal) one; the peduncles also mostly lateral and extra-axillary. (Name of unknown derivation.)

* *Anthers shortish.* (*Plants not prickly.*)

1. **S. Dulcamàra**, L. (Bittersweet.) *Stem somewhat shrubby, climbing*, nearly smooth; *leaves ovate-heart-shaped*, the upper *halberd-shaped, or with two ear-like lobes at the base;* flowers (purple) in small cymes; berries oval, scarlet. — Moist banks and around dwellings. (Nat. from Eu.)

2. **S. nìgrum**, L. (Common Nightshade.) *Annual*, low, much branched and often spreading, rough on the angles; *leaves ovate, wavy-toothed; flowers* (very small, white) *in small and umbel-like lateral clusters*, drooping; berries globular, black. — Shaded grounds, and fields; common. July, Aug. — A homely weed, said to be poisonous. (Nat. from Eu.)

* * *Anthers elongated, lanceolate, pointed.* (*Plants mostly prickly.*)

3. **S. Carolinénse**, L. (Horse Nettle.) Perennial, low (1° high); stem erect, prickly; leaves ovate-oblong, acute, sinuate-toothed or angled, roughish with stellate pubescence, prickly along the midrib, as also the calyx; flowers (pale blue or white, large) in simple loose racemes; berries globular, orange-yellow. — Sandy soil; Connecticut to Illinois and southward. June–Aug. (S. Virginianum, L., is not here identified as distinct.)

S. mammòsum, L., is not a native of our district.

S. tuberòsum, L., is the cultivated Potato, and S. Melongèna, L., the Egg-Plant.

Lycopérsicum esculéntum, Mill., is the Tomato, now separated from Solanum.

2. PHỲSALIS, L. Ground Cherry.

Calyx 5-cleft, reticulated and enlarging after flowering, at length much inflated and enclosing the 2-celled globular (edible) berry. Corolla spreading-bell-shaped or somewhat funnel-form, with a very short tube, marked with 5 concave spots at the base; the plaited border somewhat 5-lobed or 5-toothed. Stamens 5, erect: anthers separate, opening lengthwise. — Herbs (in this country), with the leaves often unequally in pairs, and the 1-flowered nodding peduncles extra-axillary. Corolla greenish-yellow in our species, often with brownish spots in the throat. (Name, φυσαλίς, *a bladder*, from the inflated calyx.)

* *Root annual: anthers blue or violet.*

1. **P. angulàta**, L. *Glabrous*, erect, much branched (2°–3° high); leaves ovate or ovate-oblong, often very sharply toothed; corolla somewhat 5-

lobed, small (3″–4″ long), not spotted; calyx with broadly triangular-subulate teeth as long as the tube, in fruit conical-ovate and sharply 5-angled (1′–1½ long). — Light soils, not rare southward. Perhaps introduced.

Var.? **Philadélphica.** *Nearly glabrous;* calyx-teeth shorter and broader, less closed or open at the summit in fruit; corolla sometimes brownish in the throat. (P. Philadelphica, *Lam.*, &c.) — New England? to Illinois and southward. July–Sept.

2. **P. pubéscens,** L. *Pubescent or clammy-hairy, diffusely much branched or at length decumbent;* leaves ovate or heart-shaped (very variable); corolla (4″–5″ long) dark brown in the throat; calyx with triangular-lanceolate acute teeth, in fruit ovate-pointed. (P. hirsuta, *Dunal*. P. obscura, *Michx.* in part, &c.) — Low grounds; common southward and westward.

* * *Root perennial: anthers yellow.* (*Corolla ½′–¾′ long.*)

3. **P. viscòsa,** L. Clammy-pubescent, diffusely much branched and widely spreading, or at first erect (½°–2° high); leaves ovate or slightly heart-shaped, sometimes oblong, often roughish-downy underneath, repand-toothed, obtusely toothed, or entire; corolla almost entire, brownish in the throat; teeth of the clammy-hairy calyx ovate-lanceolate. (P. Pennsylvanica, *L.*, P. heterophylla, *Nees*, and P. nyctaginea, *Dunal*, appear to be only states of this.) — Light or sandy soils, New England to Wisconsin and southward; very common. July–Sept. — Corolla ¾′–1′ broad when expanded.

3. NICÁNDRA, Adans. Apple of Peru.

Calyx 5-parted, 5-angled, the divisions rather arrow-shaped, enlarged and bladder-like in fruit, enclosing the 3–5-celled globular dry berry. Corolla open-bell-shaped, the plaited border nearly entire. Otherwise much like Physalis. — An annual smooth herb (2°–3° high), with ovate sinuate-toothed or angled leaves, and solitary pale blue flowers on axillary and terminal peduncles. (Named after the poet *Nicander* of Colophon.)

1. **N.** physaloìdes, Gærtn. — Waste grounds, near dwellings. (Adv. from Peru.)

4. HYOSCỲAMUS, Tourn. Henbane.

Calyx bell-shaped or urn-shaped, 5-lobed. Corolla funnel-form, oblique, with a 5-lobed more or less unequal plaited border. Stamens declined. Pod enclosed in the persistent calyx, 2-celled, opening transversely all round near the apex, which falls off like a lid. — Clammy-pubescent, fetid, narcotic herbs, with lurid flowers in the axils of angled or toothed leaves. (Name composed of ὗς, ὑός, *a hog*, and κύαμος, *a bean;* the plant said by Ælian to be poisonous to swine.)

1. **H.** nìger, L. (Black Henbane.) Leaves clasping, sinuate-toothed and angled; flowers sessile, in one-sided leafy spikes; corolla dull yellowish, strongly reticulated with purple veins. ① — Escaped from gardens to roadsides. (Adv. from Eu.)

5. DATÙRA, L. JAMESTOWN-WEED. THORN-APPLE.

Calyx prismatic, 5-toothed, separating transversely above the base in fruit, the upper part falling away. Corolla funnel-form, with a large and spreading 5–10-toothed plaited border. Stigma 2-lipped. Pod globular, prickly, 4-valved, 2-celled, with 2 thick placentæ projected from the axis into the middle of the cells, and connected with the walls by an imperfect false partition, so that the pod is 4-celled except near the top, the placentæ seemingly borne on the middle of the alternate partitions. Seeds rather large, flat. — Rank weeds, narcotic-poisonous, with a rank odor, bearing ovate angular-toothed leaves, and large and showy flowers on short peduncles in the forks of the branching stem. (Altered from the Arabic name *Tatorah.*)

1. **D. STRAMÒNIUM**, L. (COMMON STRAMONIUM.) **Leaves ovate, smooth; stem green; corolla white, with 5 teeth.** — Var. TÁTULA has the stem and corolla tinged with purple. ① — Waste grounds; a well-known weed, with large flowers (3′ long). July – Sept. (Adv. from Asia or Trop. Amer.)

6. NICOTIÀNA, L. TOBACCO.

Calyx tubular-bell-shaped, 5-cleft. Corolla funnel-form or salver-form, usually with a long tube; the plaited border 5-lobed. Stigma capitate. Pod 2-celled, 2–4-valved from the apex. Seeds minute. — Rank acrid-narcotic herbs, mostly clammy-pubescent, with ample entire leaves, and lurid racemed or panicled flowers. (Named after *John Nicot,* who was thought to have introduced the Tobacco into Europe.)

1. **N. RÚSTICA**, L. (WILD TOBACCO.) **Leaves ovate, petioled; tube of the dull greenish-yellow corolla cylindrical, two thirds longer than the calyx, the lobes rounded.** ① — Old fields, from New York westward and southward: a relic of cultivation by the Indians. (Adv. from Trop. Amer.)

N. TABÀCUM, L., is the cultivated TOBACCO.

ÁTROPA BELLADÓNNA, L. (DEADLY NIGHTSHADE), a plant with purplish-black poisonous berries, has escaped from gardens in one or two places.

LÝCIUM BÁRBARUM, L. (BARBARY BOX-THORN, or MATRIMONY-VINE), a slightly thorny trailing shrubby vine, well known in cultivated grounds, is yet hardly spontaneous.

CÁPSICUM ÁNNUUM, L., is the CAYENNE, or RED PEPPER of the gardens.

ORDER 83. GENTIANÀCEÆ. (GENTIAN FAMILY.)

Smooth herbs, with a colorless bitter juice, opposite and sessile entire and simple leaves (except in Tribe II.) *without stipules, regular flowers with the stamens as many as the lobes of the corolla, which are convolute* (*rarely imbricated, and sometimes valvate*) *in the bud, a 1-celled ovary with 2 parietal placentæ; the fruit mostly a 2-valved* (*septicidal*) *many-seeded pod.* — Flowers solitary or cymose. Calyx persistent. Corolla mostly withering-persistent; the stamens inserted on its tube. Seeds anatropous, with a minute embryo in fleshy albumen, sometimes covering the entire face of the pericarp! (Bitter-tonic plants.)

Synopsis.

TRIBE I. **GENTIANEÆ.** Lobes of the corolla convolute (twisted to the right) in the bud (with the sinuses mostly plaited), in Obolaria imbricated. Leaves almost always opposite or whorled, entire, those of the stem sessile. Seeds very small and numerous, with a cellular coat; in Obolaria, Bartonia, and several Gentians, the ovules and seeds covering the whole face of the pericarp.

* Style distinct and slender, deciduous.

1. SABBATIA. Corolla wheel-shaped, 5-12-parted: anthers curved
2. ERYTHRÆA. Corolla funnel-form or salver-shaped, 4-5-cleft: anthers spiral.

* * Style (if any) and stigmas persistent: anthers straight.

← Corolla with a glandular spot or hollow spur to each lobe.

3. FRASERA. Corolla 4-parted, wheel-shaped, spurless. Pod flat
4. HALENIA. Corolla 4-5-cleft, bell-shaped, and with as many spurs from the base.

← ← Corolla without glands or spurs.

5. GENTIANA. Calyx 4-5-cleft. Corolla mostly with plaited folds at the sinuses.
6. BARTONIA. Calyx 4-parted. Corolla 4-parted, with no plaits at the sinuses.
7. OBOLARIA. Calyx 2-leaved. Corolla tubular-bell-shaped, 4-lobed, with no plaits, the lobes imbricated in the bud!

TRIBE II. **MENYANTHEÆ.** Lobes of the corolla valvate in the bud, with the edges turned inwards. Stem-leaves alternate, petioled. Seed-coat hard or bony.

8. MENYANTHES. Corolla bearded inside. Leaves 3-foliolate.
9. LIMNANTHEMUM. Corolla smooth above. Leaves simple, rounded.

1. SABBÁTIA, Adans. AMERICAN CENTAURY.

Calyx 5-12-parted, the divisions slender. Corolla 5-12-parted, wheel-shaped. Stamens 5-12: anthers recurved. Style 2-parted, slender. — Biennials or annuals, with slender stems, and cymose-panicled handsome (white or rose-purple) flowers. (Dedicated to *Sabbati*, an early Italian botanist.)

* *Corolla 5-parted, or rarely 6-7-parted.*

← *Corolla white, often turning yellowish in drying: cymes corymbed, many-flowered.*

1. **S. paniculàta,** Pursh, Ell. *Stem brachiately much-branched* (1°-2° high), rather terete, but angled with 4 sharp lines; *leaves linear or the lower oblong, obtuse,* 1-*nerved,* nearly equalling the internodes; calyx-lobes linear-thread-form, much shorter than the corolla. — Damp pine woods, Virginia and southward. June-Aug.

2. **S. lanceolàta,** Torr. & Gr. *Stem simple* (1°-3° high) bearing a flat-topped cyme; *leaves ovate-lanceolate or ovate, 3-nerved,* the upper acute, much shorter than the internodes; calyx-lobes longer than in No. 1; the flowers larger. (Chironia lanceolata, *Walt.* S. corymbosa, *Baldw.*) — Wet pine barrens, from New Jersey southward. June, July.

← ← *Corolla rose-color or pink, rarely white, mostly with a yellowish or greenish eye.*

++ *Erect, pyramidally many-flowered: branches opposite, erectish: peduncles short.*

3. **S. brachiàta,** Ell. *Stem slightly angled,* simple below (1°-2° high); *leaves linear and linear-oblong, obtuse,* or the upper acute; branches rather few-

flowered, forming an oblong panicle; calyx-lobes ½ or ⅓ shorter than the corolla. (S. concinna, *Wood*, ex char.) — Dryish grassy places, Virginia, Indiana (*Wood*), and southward. June – Aug. — Corolla 1' – 1¼' broad; the lobes narrower than in the next.

4. **S. angulàris,** Pursh. *Stem somewhat 4-winged-angled,* much branched above (1° – 2½° high), many-flowered; *leaves ovate,* acutish, 5-nerved, with a *somewhat heart-shaped clasping* base; calyx-lobes ⅓ to ½ the length of the corolla. — Dry river-banks, &c., New York to Illinois and southward. July, Aug. — Corolla 1½' wide, deep rose-purple; the lobes obovate.

++ ++ *Erect or soon diffuse, loosely branched; the branches alternate or forking (stems terete or slightly 4-angled): peduncles elongated and 1-flowered.*

5. **S. calycòsa,** Pursh. Diffusely forking (½° – 1° high), pale; *leaves oblong or lance-oblong, narrowed at the base* (1½' – 2' long); *calyx-lobes foliaceous, spatulate-lanceolate* (¾' – 1' long), *exceeding the almost white corolla.* — Marshes, coast of Virginia, and southward. June – Sept.

6. **S. stellàris,** Pursh. Loosely branched and forking (5' – 15' high); *leaves oblong- or ovate-lanceolate,* or the upper linear; *calyx-lobes awl-shaped-linear, varying from half to nearly the length of the bright rose-purple corolla.* — Salt marshes, Massachusetts to Virginia, and southward. July – Sept. — This may run into the next.

7. **S. grácilis,** Salisb. *Stem very slender,* at length diffusely branched (1° – 2° high); the branches and long peduncles filiform; *leaves linear,* or the lower lance-linear, the uppermost similar to the *setaceous calyx-lobes, which equal the rose-purple corolla.* (Chironia campanulata, *L.*) — Brackish marshes and river-banks, New Jersey (Burlington, *Mr. Cooley*) to Virginia, and southward. June – Sept.

* * *Corolla 9 – 12-parted, large (about 2' broad).* (Lapithea, *Griseb.*)

8. **S. chloroìdes,** Pursh. Stem nearly round (1° – 2° high), loosely panicled above; the peduncles slender, 1-flowered; leaves oblong-lanceolate; calyx-lobes linear, half the length of the deep rose-colored (rarely white) corolla. — Borders of brackish ponds, Plymouth, Massachusetts, to Virginia, and southward. July – Sept. — One of our handsomest plants.

2. ERYTHRÆA, Pers. CENTAURY.

Calyx 4 – 5-parted, the divisions slender. Corolla funnel-form or salver-form, with a slender tube and a 4 – 5-parted limb, which in withering twists on the pod. Anthers exserted, erect, twisting spirally. Style slender, single: stigma capitate or 2-lipped. — Low and small branching annuals, chiefly with rose-purple or reddish flowers; whence the name, from ἐρυθρός, *red.* (All our Northern species were probably introduced from Europe, and occur only in a few localities.)

1. **E. CENTAÙRIUM,** Pers. (CENTAURY.) Stem upright, *corymbosely branched* above; leaves oblong or elliptical, acutish; the uppermost linear; *cymes clustered, flat-topped, the flowers all nearly sessile;* tube of the (purple-rose-colored)

corolla not twice the length of the oval lobes. — Oswego, New York, near the old fort. July. — Plant 6′ - 12′ high: corolla 3″ - 4″ long. (Adv. from Eu.)

2. **E.** RAMOSÍSSIMA, Pers., var. PULCHÉLLA, Griseb. Low (2′ - 6′ high); *stem many times forked above and forming a diffuse cyme;* leaves ovate-oblong or oval; *flowers all on short pedicels;* tube of the (pink-purple) corolla thrice the length of the elliptical-oblong lobes. (E. Muhlenbergii, *Griseb.*, as to Penn. plant. Éxacum pulchellum, *Pursh.*) — Wet or shady places, Long Island to E. Virginia: scarce. — Flowers smaller than in No. 1. (Nat. from Eu.)

3. **E.** SPICÀTA, Pers. Stem strictly upright; the *flowers sessile and spiked along one side of the simple or rarely forked branches;* leaves oval and oblong, rounded at the base, acutish; tube of the (rose-colored or whitish) corolla scarcely longer than the calyx, the lobes oblong. (E. Pickeringii, *Oakes.*) — Sandy shore, Massachusetts (Nantucket, *Oakes*) and Virginia (Norfolk, *Rugel*). — Plant 6′ - 10′ high, remarkable for the spike-like arrangement of the flowers. (Nat. from Eu.?)

3. FRÀSERA, Walt. AMERICAN COLUMBO.

Calyx deeply 4-parted. Corolla deeply 4-parted, wheel-shaped, each division with a glandular and fringed pit on the upper side. Filaments awl-shaped, usually somewhat monadelphous at the base: anthers oblong, versatile. Style persistent: stigma 2-lobed. Pod oval, flattened, 4 - 14-seeded. Seeds large and flat, wing-margined. — Tall and showy herbs, with upright and mostly simple stems, bearing whorled leaves, and numerous peduncled flowers in open cymes, which are disposed in an ample elongated panicle. (Dedicated to *John Fraser*, a well-known and indefatigable collector in this country towards the close of the last century.)

1. **F. Carolinénsis,** Walt. Smooth, tall (3° - 8° high); leaves mostly in fours, lance-oblong, the lowest spatulate (1° long), veiny; panicle pyramidal, loosely flowered; divisions of the corolla oblong, mucronate, longer than the narrowly lanceolate calyx-lobes, each with a large and round gland on their middle; pod much flattened parallel with the flat valves. ♃ ② ? — Rich dry soil, S. W. New York to Wisconsin and Kentucky, and southward. July. — Root very thick and bitter. Corolla 1′ broad, light greenish-yellow, marked with brown-purple dots.

4. HALÈNIA, Borkh. SPURRED GENTIAN.

Calyx 4 - 5-parted. Corolla short bell-shaped, 4 - 5-cleft, without folds or fringe, prolonged at the base underneath the erect lobes into spurs, which are glandular in the bottom. Stigmas 2, sessile, persistent on the oblong flattish pod. Seeds rather numerous, oblong. — Small and upright herbs, with yellowish or purplish panicled-cymose flowers. (Name of unknown meaning.)

1. **H. defléxa,** Griseb. Leafy (9′ - 18′ high), simple or branched above; leaves 3 - 5-nerved, the lowest oblong-spatulate and petioled; the others oblong-lanceolate, acute; spurs cylindrical, obtuse, curved and descending, half the length of the acutely 4-lobed corolla. ① ② (Swértia corniculàta, *L.*, partly.)

— Damp woods, from the northern parts of Maine, to N. Wisconsin, and northward. July, August.

5. GENTIÀNA, L. Gentian.

Calyx 4–5-cleft. Corolla 4–5-lobed, regular, usually with intermediate plaited folds, which bear appendages or teeth at the sinuses. Style short or none: stigmas 2, persistent. Pod oblong, 2-valved; the innumerable seeds either borne on placentæ at or near the sutures, or in most of our species covering nearly the whole inner face of the pod. (*H. J. Clark!*) — Flowers solitary or cymose, showy. (Name from *Gentius*, king of Illyria, who used some species medicinally.)

§ 1. AMARELLOÌDES, Torr. & Gr. — *Corolla tubular-funnel-form, without crown or plaited folds, and with the lobes naked: anthers separate, fixed by the middle, introrse in the bud, but retrorsely reversed after the flower opens: seeds wingless: annuals.*

1. **G. quinqueflòra,** Lam. (Five-flowered Gentian.) Stem rather slender, branching (1° high); leaves ovate-lanceolate from a partly clasping and heart-shaped base, 3–7-nerved, tipped with a minute point; branches racemed or panicled, about 5-flowered at the summit; lobes of the small 5-cleft calyx awl-shaped-linear; lobes of the pale-blue corolla triangular-ovate, bristle-pointed, one fourth the length of the slender obconical tube. — Var. occidentàlis has linear-lanceolate calyx-lobes which are more leaf-like, and about half the length of the corolla. — Dry hilly woods, Vermont to Wisconsin and southward, especially along the Alleghanies: the var. is the common form in the Western States. Aug., Sept. — Corolla light purplish-blue, nearly 1′ long; in the variety proportionally shorter.

§ 2. CROSSOPÉTALUM, Frœl. — *Corolla funnel-form, gland-bearing between the bases of the filaments, without crown or plaited folds; the lobes fringed or toothed on the margins: anthers as in* § 1: *pod somewhat stalked: seeds wingless, clothed with little scales: annuals or biennials.*

2. **G. crinìta,** Frœl. (Fringed Gentian.) Flowers solitary on long peduncles terminating the stem or simple branches; *leaves lanceolate, or ovate-lanceolate from a partly heart-shaped or rounded base;* lobes of the 4-cleft calyx unequal, ovate and lanceolate, as long as the bell-shaped tube of the sky-blue corolla, the *lobes* of which are *wedge-obovate,* and *strongly fringed around the summit; ovary lanceolate.* — Low grounds, New England to Kentucky and Wisconsin; rather common, and sparingly beyond, both northward and southward. Sept. — Plant 1°–2° high: the showy corolla 2′ long.

3. **G. detónsa,** Fries. (Smaller Fringed Gentian.) Stem simple or with slender branches, terminated by solitary flowers on very long peduncles; *leaves linear or lanceolate-linear;* lobes of the 4- (rarely 5-) cleft calyx unequal, ovate or triangular and lanceolate, pointed; *lobes of the* sky-blue *corolla spatulate-oblong,* with ciliate-fringed margins, *the fringe shorter or nearly obsolete at the summit; ovary elliptical or obovate.* — Moist grounds, Niagara Falls to Wisconsin (*Lapham*), and northwestward. Sept. (Eu.)

§ 3. **PNEUMONÁNTHE**, Necker. — *Corolla bell-shaped or obconical, 5-lobed, with plaited folds which project into appendages in the sinuses: anthers erect, fixed by the deep sagittate base, extrorse, often converging or cohering with each other in a ring or tube, stalked: seeds commonly winged: perennials.*

* *Flowers nearly sessile, clustered, rarely solitary, 2-bracteolate.*

+ *Anthers entirely separate: seeds wingless.*

4. **G. ochroleùca,** Frœl. (Yellowish-White Gentian.) Stems ascending, mostly smooth; the flowers in a dense terminal cluster and often also in axillary clusters; *leaves obovate-oblong,* the lowest broadly obovate and obtuse, the uppermost somewhat lanceolate, *all narrowed at the base;* calyx-lobes linear, unequal, much longer than its tube, *rather shorter than the greenish-white open corolla,* which is painted inside with green veins and lilac-purple stripes; its lobes ovate, very much exceeding the small and sparingly toothed oblique appendages; pod included in the persistent corolla. — Dry grounds, S. Penn. (rare) to Virginia, and common southward. Sept., Oct.

+ + *Anthers cohering with each other more or less firmly: seeds winged.*

5. **G. álba,** Muhl. Cat.! (Whitish Gentian.) Stems upright, stout, very smooth; flowers closely sessile and much crowded in a dense terminal cluster, and sometimes also clustered in the upper axils; *leaves ovate-lanceolate from a heart-shaped closely clasping base,* gradually tapering to a point; calyx-lobes ovate, shorter than the top-shaped tube, and many times shorter than the tube of the corolla, reflexed-spreading; *corolla white more or less tinged with greenish or yellowish, inflated-club-shaped, at length open, its short and broad ovate lobes nearly twice the length of the toothed appendages;* pod nearly included; seeds broadly winged. (G. flávida, *Gray, in Sill. Jour.* G. ochroleuca, *Sims., Darlingt., Griseb.* in part, &c.) — Glades and low grounds, S. W. New York to Virginia along the Alleghanies, and west to Illinois, Wisconsin, &c. July – Sept.

6. **G. Andréwsii,** Griseb. (Closed Gentian.) Stems upright, smooth; flowers closely sessile in terminal and upper axillary clusters; *leaves ovate-lanceolate and lanceolate from a narrower base,* gradually pointed, rough-margined; calyx-lobes ovate or oblong, recurved, shorter than the top-shaped tube, and much shorter than the *inflated club-shaped blue corolla, which is closed at the mouth, its proper lobes obliterated,* the apparent lobes consisting of the broad fringe-toothed and notched appendages; pod finally projecting out of the persistent corolla; seeds broadly winged. (G. Saponaria, *Frœl., &c.,* not of *L.*) — Moist rich soil; common, especially northward. Sept. — Corolla 1′ or more long, blue fading to purplish, striped inside; the folds whitish.

7. **G. Saponària,** L. (Soapwort Gentian.) Stem erect or ascending, smooth; the flowers clustered at the summit and more or less so in the axils; *leaves ovate-lanceolate, oblong, or lanceolate-obovate,* with rough margins, narrowed at the base; calyx-lobes linear or spatulate, acute, equalling or exceeding the tube, half the length of the corolla; *lobes of the club-bell-shaped light-blue corolla obtuse, erect or converging, short and broad, but distinct, and more or less longer than the conspicuous 2-cleft and minutely toothed appendages; seeds acute, narrowly winged.* (G. Catesbæi, *Walt.*) — Moist woods, S. Penn.? Maryland, to Virginia, Kentucky, and southward, principally in the Alleghanies. Aug., Sept.

Var. **lineàris.** Slender, nearly simple (1°-2° high); leaves linear or lance-linear (2′-3′ long), acutish; appendages of the corolla shorter and less cleft, or almost entire. (G. Pneumonánthe, *Amer. auth.* & *ed.* 1: also G. Saponaria var. Frœlichii. G. linearis, *Frœl.*) — Mountain wet glades of Maryland and Penn., L. Superior, Northern New York, New Hampshire (near Concord), and Maine (near Portland). Aug.

8. **G. pubérula,** Michx. Stems erect or ascending (8′-16′ high), mostly *rough* and minutely pubescent above; *leaves rigid* varying from *linear-lanceolate to oblong-lanceolate*, rough-margined (1′-2′ long); flowers clustered, rarely solitary; calyx-lobes lanceolate, not longer than the tube, much shorter than the *bell-funnel-form open bright-blue corolla, the spreading ovate lobes* of which are acutish and twice or thrice the length of the cut-toothed appendages. (G. Catesbæi, *Ell.* G. Saponaria, var. puberula, *ed.* 1.) — Dry prairies and barrens, Ohio to Wisconsin, and southward. Aug., Sept. — Corolla large for the size of the plant, 1½′-2′ long. Seeds (also in G. Pneumonanthe) not covering the walls, as they do in the rest of this division.

* * *Flower solitary and terminal, peduncled, mostly bractless.*

9. **G. angustifòlia,** Michx. Stems slender and ascending (6′-15′ high), simple; leaves linear or the lower oblanceolate, rigid; corolla open-funnel-form, azure-blue (2′ long), about twice the length of the thread-like calyx-lobes, its ovate spreading lobes twice the length of the cut-toothed appendages; the tube striped with yellowish. — Moist pine barrens, New Jersey, and southward (where there is a white variety). Sept.-Nov.

6. BARTÒNIA, Muhl. (CENTAURÉLLA, *Michx.*)

Calyx 4-parted. Corolla deeply 4-cleft, destitute of glands, fringes, or folds. Stamens short. Pod oblong, flattened, pointed with a large persistent at length 2-lobed stigma. Seeds minute, innumerable, covering the whole inner surface of the pod! — Small annuals, or biennials, with thread-like stems, and little awl-shaped greenish scales in place of leaves. Flowers small, white, peduncled. (Dedicated, in the year 1801, to the distinguished *Prof. Barton*, of Philadelphia.)

1. **B. tenélla,** Muhl. Stems (3′-10′ high) branched above; the branches or peduncles mostly opposite, 1-3-flowered; *lobes of the corolla oblong, acutish, rather longer than the calyx*, or sometimes twice as long; *anthers roundish*; ovary 4-angled, the cell somewhat cruciform. — Open woods, E. New England to Virginia and southward; common. Aug. — Centaurella Moseri, *Griseb.*, is only a variety with the scales and peduncles mostly alternate, and the petals acute.

2. **B. vérna,** Muhl. Stem (2′-6′ high) 1-few-flowered; *lobes of the corolla spatulate, obtuse, spreading, thrice the length of the calyx; anthers oblong;* ovary flat. — Bogs near the coast, Virginia and southward. March. — Flowers 3″-4″ long, larger than in No. 1.

7. OBOLÀRIA, L. OBOLARIA.

Calyx of 2 spatulate spreading sepals, resembling the leaves. Corolla tubular-bell-shaped, withering-persistent, 4-cleft; the lobes oval-oblong, or with age

spatulate, imbricated in the bud! Stamens inserted at the sinuses of the corolla, short. Style short, persistent: stigma 2-lipped. Pod ovoid, 1-celled, the cell cruciform: the seeds covering the whole face of the walls.—A low and very smooth purplish-green perennial (3′–8′ high), with a simple or sparingly branched stem, opposite wedge-obovate leaves; the dull white or purplish flowers solitary or in clusters of three, terminal and axillary, nearly sessile. (Name from ὀβολός, a small Greek coin; to which, however, the leaves of this plant bear no manifest resemblance.)

1. **O. Virgínica,** L. (*Gray, Chlor. Bor.-Am., t.* 3.)—Rich soil, in woods, from New Jersey to Ohio, Kentucky, and southward: rather rare. April, May.

8. MENYÁNTHES, Tourn. BUCKBEAN.

Calyx 5-parted. Corolla short funnel-form, 5-parted, deciduous, the whole upper surface white-bearded, valvate in the bud with the margins turned inward. Style slender, persistent: stigma 2-lobed. Pod bursting somewhat irregularly, many-seeded. Seed-coat hard, smooth, and shining.—A perennial alternate-leaved herb, with a thickish creeping rootstock, sheathed by the membranous bases of the long petioles, which bear 3 oval or oblong leaflets at the summit; the flowers racemed on the naked scape (1° high), white or slightly reddish. (The ancient Theophrastian name, probably from μήν, *month*, and ἄνθος, *a flower*, some say from its flowering for about that time.)

1. **M. trifoliàta,** L.—Bogs, New England to Pennsylvania, Wisconsin, and northward. May, June. (Eu.)

9. LIMNÁNTHEMUM, Gmelin. FLOATING HEART.

Calyx 5-parted. Corolla almost wheel-shaped, 5-parted, the divisions fringed or bearded at the base or margins only, folded inwards in the bud, bearing a glandular appendage near the base. Style short or none: stigma 2-lobed, persistent. Pod few–many-seeded, at length bursting irregularly. Seed-coat hard.—Perennial aquatics, with rounded floating leaves on very long petioles, which, in most species, bear near their summit the umbel of (polygamous) flowers, along with a cluster of short and spur-like roots, sometimes shooting forth new leaves from the same place, and so spreading by a sort of proliferous stolons. (Name compounded of λίμνη, *a marsh* or *pool*, and ἄνθεμον, *a blossom*, from the situations where they grow.)

1. **L. lacunòsum,** Griseb. (partly). Leaves round-heart-shaped, thickish; lobes of the (white) corolla broadly oval, naked, except the crest-like yellowish gland at their base, twice the length of the lanceolate calyx-lobes; style none; seeds smooth and even. (Villársia lacunosa, *Vent.* V. cordàta, *Ell.*)—Shallow ponds, from Maine and N. New York to Virginia and southward. June–Sept.—Leaves 1′–2′ broad, entire, on petioles 4′–15′ long, according to the depth of the water.

L. TRACHYSPÉRMUM of the South has roughened seeds, as its name denotes, and is entirely distinct.

ORDER 84. APOCYNÀCEÆ. (DOGBANE FAMILY.)

Plants with milky acrid juice, entire (chiefly opposite) leaves without stipules, regular 5-merous and 5-androus flowers; the 5 lobes of the corolla convolute and twisted in the bud; the filaments distinct, inserted on the corolla, and the pollen granular; the calyx entirely free from the two ovaries, which are usually quite distinct (and forming pods), though their styles or stigmas are united into one. — Seeds amphitropous or anatropous, with a large straight embryo in sparing albumen, often bearing a tuft of down (comose). — Chiefly a tropical family (of acrid-poisonous plants), represented in our district by three genera.

Synopsis.

1. AMSONIA. Seeds naked. Corolla with the tube bearded inside. Anthers longer than the filaments. Leaves alternate.
2. FORSTERONIA. Seeds comose. Corolla funnel-form, not appendaged. Filaments slender. Calyx glandular inside. Leaves opposite.
3. APOCYNUM. Seeds comose. Corolla bell-shaped, appendaged within. Filaments short, broad, and flat. Calyx not glandular. Leaves opposite.

1. AMSÒNIA, Walt. AMSONIA.

Calyx 5-parted, small. Corolla with a narrow funnel-form tube bearded inside, especially at the throat; the limb divided into 5 long linear lobes. Stamens 5, inserted on the tube, included: anthers obtuse at both ends, longer than the filaments. Ovaries 2: style 1: stigma rounded, surrounded with a cup-like membrane. Pods (follicles) 2, long and slender, many-seeded. Seeds cylindrical, abrupt at both ends, packed in one row, naked. — Perennial herbs, with *alternate leaves*, and pale blue flowers in terminal panicled cymes. (Said to be named for a *Mr. Charles Amson.*)

1. **A. Tabernæmontàna,** Walt. Leaves ovate-lanceolate, rather obtuse at the base, short-petioled; tube of the corolla above hairy outside. (A. latifolia, *Michx.*) — Damp grounds, Illinois (*Mead,* &c.), Virginia? and southward. May.

A. CILIÀTA, with linear leaves, and A. SALICIFÒLIA, with lanceolate leaves, may be expected in Virginia.

2. FORSTERÒNIA, Meyer. FORSTERONIA.

Calyx 5-parted, with 3–5 glands at its base inside. Corolla funnel-form, not appendaged; the limb 5-lobed. Stamens 5, inserted on the base of the corolla, included: filaments slender: anthers arrow-shaped, with an inflexed tip, adhering to the stigma. Pods (follicles) 2, slender, many-seeded. Seeds oblong, with a tuft of down. — Twining plants, more or less woody, with opposite leaves and small flowers in cymes. (Named for *Mr. T. F. Forster*, an English botanist.)

1. **F. diffórmis,** A. DC. Nearly herbaceous and glabrous; leaves oval-lanceolate, acuminate, thin; calyx-lobes taper-pointed; corolla pale yellow.

(Echites difformis, *Walt.*) — Damp grounds, S. E. Virginia and southward April.

3. APÒCYNUM, Tourn. DOGBANE. INDIAN HEMP.

Calyx 5-parted, the lobes acute. Corolla bell-shaped, 5-cleft, bearing 5 triangular appendages in the throat opposite the lobes. Stamens 5, inserted on the very base of the corolla: filaments flat, shorter than the arrow-shaped anthers, which converge around the ovoid obsqurely 2-lobed stigma, and are slightly adherent to it by their inner face. Style none: stigma large, ovoid, slightly 2-lobed. Fruit of 2 long and slender follicles. Seeds comose with a long tuft of silky down at the apex. — Perennial herbs, with upright branching stems, opposite mucronate-pointed leaves, a tough fibrous bark, and small and pale cymose flowers on short pedicels. (An ancient name of the Dogbane, composed of ἀπό, *from*, and κύων, *a dog*, to which the plant was thought to be poisonous.)

1. **A. androsæmifòlium,** L. (SPREADING DOGBANE.) Smooth, branched above; *branches divergently forking; leaves ovate, distinctly petioled; cymes loose, spreading*, mostly longer than the leaves; *corolla* (pale rose-color, ⅓' broad) *open-bell-shaped, with revolute lobes, the tube much longer than the ovate pointed divisions of the calyx.* — Varies, also, with the leaves downy underneath. — Borders of thickets; common, especially northward. June, July. — Pods 3'-4' long, pendent.

2. **A. cannábinum,** L. (INDIAN HEMP.) Stem and branches *upright or ascending*, terminated by *erect and close many-flowered cymes*, which are usually shorter than the leaves; *corolla* (greenish-white) *with nearly erect lobes, the tube not longer than the lanceolate divisions of the calyx.* — Var. GLABÉRRIMUM, *DC.* Entirely smooth; leaves oblong or oblong-lanceolate, on short but manifest petioles, obtuse or rounded, or the upper acute at both ends. — Var. PUBÉSCENS, *DC.* Leaves oblong, oval, or ovate, downy underneath or sometimes on both sides, as well as the cymes. (A. pubescens, *R. Br.*) — Var. HYPERICIFÒLIUM. Leaves more or less heart-shaped at the base and on very short petioles, commonly smooth throughout. (A. hypericifolium, *Ait.*) — River-banks, &c.; common. July, Aug. — Plant 2°-3° high, much more upright than the last; the flowers scarcely half the size. These different varieties evidently run into one another.

VÍNCA MÌNOR, the common PERIWINKLE, and NÉRIUM OLEÁNDER, the OLEANDER, are common cultivated plants of this family.

ORDER 85. ASCLEPIADÀCEÆ. (MILKWEED FAMILY.)

Plants with milky juice, and opposite or whorled (rarely scattered) entire leaves; the follicular pods, seeds, anthers connected with the stigma, sensible properties, &c., just as in the last family; from which they differ in the commonly valvate corolla, and in the singular connection of the anthers with the stigma, the cohesion of the pollen into wax-like or granular masses, &c., as explained under the first and typical genus.

Synopsis.

TRIBE I. ASCLEPIADEÆ. **Filaments monadelphous. Pollen-masses 10, waxy, fixed to the stigma by pairs, pendulous and vertical.**

1. ASCLEPIAS. Calyx and corolla reflexed, deeply 5-parted. Crown of 5 hooded fleshy bodies (nectaries, *L.*), with an incurved horn rising from the cavity of each.

2. ACERATES. Calyx and corolla reflexed or merely spreading. Crown as in No. 1, but without a horn inside.

3. ENSLENIA. Calyx and corolla erect. Crown of 5 membranaceous bodies, flat, terminated by a 2-cleft tail or awn.

TRIBE II. GONOLOBEÆ. **Filaments monadelphous. Pollen-masses 10, affixed to the stigma in pairs, horizontal.**

4. GONOLOBUS. Corolla wheel-shaped. Crown a wavy-lobed fleshy ring.

TRIBE III. PERIPLOCEÆ. **Filaments distinct or nearly so. Pollen-masses granular, separately applied to the stigma.**

5. PERIPLOCA. Corolla wheel-shaped, with 5 awned scales in the throat.

1. ASCLÈPIAS, L. MILKWEED. SILKWEED.

Calyx 5-parted, persistent; the divisions small, spreading. Corolla deeply 5-parted; the divisions valvate in the bud, reflexed, deciduous. *Crown* of 5 hooded bodies (nectaries, *L.*) seated on the tube of stamens, each containing an incurved horn. Stamens 5, inserted on the base of the corolla: filaments united in a tube (*gynostegium*) which encloses the pistil: anthers adherent to the stigma, each with 2 vertical cells, tipped with a membranaceous appendage, each cell containing a flattened pear-shaped and waxy pollen-mass; the two contiguous pollen-masses of adjacent anthers forming pairs which hang by a slender prolongation of their summits from 5 cloven glands that grow on the angles of the stigma (usually extricated from the cells by the agency of insects, and directing copious pollen-tubes into the point where the stigma joins the apex of the styles). Ovaries 2, tapering into very short styles: the large depressed 5-angled fleshy stigma common to the two. Follicles 2, one of them often abortive, soft, ovate or lanceolate. Seeds anatropous, flat, margined, downwardly imbricated all over the large placenta which separates from the suture at maturity, furnished with a long tuft of silky hairs (*coma*) at the hilum. Embryo large, with broad foliaceous cotyledons in thin albumen. — Perennial upright herbs, with thick and deep roots: peduncles terminal or mostly lateral and between the petioles, bearing simple many-flowered umbels. Leaves usually transversely veiny. (The Greek name of *Æsculapius*, to whom the genus is dedicated.)

* *Pods clothed with soft spinous projections.*

1. **A. Cornùti,** Decaisne. (COMMON MILKWEED or SILKWEED.) Stem large and stout, somewhat branched; *leaves ovate-elliptical*, with a slight point, *spreading, contracted at the base into a short but distinct petiole, minutely velvety-downy underneath* as well as the peduncles and branches; divisions of the corolla ovate (greenish-purple), about one fourth the length of the very numerous pedicels; *hoods* of the crown *ovate, obtuse, with a lobe or tooth on each side of the short and stout claw-like horn; pods ovate, covered with weak spines and woolly.* (A. Syriaca, *L.*, but the plant belongs to this country only.) — Rich soil, fields, &c.; common. July. — Plant 3° - 4° high; leaves 4′ - 8′ long, pale.

2. **A. Sullivántii**, Engelm. Mss. *Very smooth throughout*, tall; *leaves ovate-oblong from a heart-shaped sessile base, erect; hoods* of the crown *obovate, entire, obtusely 2-eared at the base* on the outside, with a slender but obtuse claw-like horn; *pods ovate-lanceolate, with small and scattered warty spines chiefly on the beak.* — Near Columbus, Ohio, *Sullivant.* W. Illinois, *Engelmann.* July. — Resembles No. 1 in appearance, in the petals, &c.; the hoods larger, and exceeding the anthers by one half.

* * *Pods not warty-roughened or prickly.*

+ *Leaves all or chiefly opposite, or the middle ones sometimes in fours.*

++ *Stems simple or nearly so (above usually with 2 lines of minute pubescence).*

3. **A. phytolaccoìdes**, Pursh. (Poke-Milkweed.) Stem (3° – 5° high) smooth; *leaves broadly ovate, or the upper oval-lanceolate and pointed at both ends, short-petioled*, smooth or slightly downy underneath (5′ – 8′ long); *pedicels loose and nodding, numerous, long* and slender (1′ – 3′ long), equalling the peduncle, *many times longer than the ovate-oblong divisions of the* (*greenish*) *corolla;* hoods of the crown (white) truncate, the margins 2-toothed at the summit, *the horn with a long projecting awl-shaped point;* pods minutely downy. — Moist copses; common. June.

4. **A. purpuráscens**, L. (Purple Milkweed.) Stem rather slender (2° – 3° high); *leaves elliptical or ovate-oblong*, the lower mucronate, the upper taper-pointed, *minutely velvety-downy underneath*, smooth above, *contracted at the base into a short petiole; pedicels* shorter than the mostly terminal peduncle, *about twice the length of the dark purple lanceolate-ovate divisions of the corolla;* hoods of the crown oblong, abruptly narrowed above; *the horn broadly scythe-shaped, with a narrow and abruptly inflexed horizontal point;* pods smooth. (A. amœna, *L.*, *Michx.*) — Border of woods, &c., N. England to Michigan and Kentucky: common westward. July. — Flowers as large as in No. 1: peduncle and pedicels downy along one side.

5. **A. variegàta**, L. (Variegated Milkweed.) *Nearly smooth* (1° – 2° high); *leaves ovate, oval, or obovate*, somewhat wavy, mucronate, *contracted into short petioles; pedicels* (*numerous and crowded*) *and peduncle short, downy;* divisions of the *corolla ovate* (*white*); hoods of the crown orbicular, entire, the horn semilunar with a horizontal point; pods slightly downy. (A. nivea, *L.*, in part. A. hýbrida, *Michx.*) — Dry woods, S. New York to Wisconsin and southward. July. — Remarkable for its very compact umbels of nearly white flowers, often purple in the centre. Leaves 4 – 5 pairs, the middle ones sometimes whorled; veins often purple. Peduncles 1 – 3, usually ½′ long.

6. **A. Nuttalliàna**, Torr. (excl. char.?) Low (6′ – 15′ high), *soft-downy*, especially the lower side of the *ovate or lance-oblong acute slightly petioled leaves; umbels loosely* 10 – 18-*flowered*, either sessile or peduncled; pedicels slender (½′ – ¾′ long); hoods of the crown oblong, obtuse, yellowish, with a small horn, about the length of the *oval greenish-white* divisions of the *corolla* (which are tinged with purple outside). (A. lanuginosa, *Nutt.*) — Prairies and Oak-openings, N. Illinois, *Vasey*, Wisconsin, *Lapham*, and westward. June. — Leaves 1½′ – 3′ long, ¾′ – 1½′ wide, smoothish above, the upper sometimes scattered. Flowers about as large as in the next.

7. **A. quadrifòlia,** Jacq. (FOUR-LEAVED MILKWEED.) *Nearly smooth* (10′ – 18′ high), slender; *leaves ovate, or sometimes ovate-lanceolate, petioled, usually taper-pointed, the middle ones in whorls of four; pedicels capillary;* divisions of the *(pale pink) corolla* oblong; hoods of the white crown elliptical-ovate, the incurved horn short and thick; pods linear-lanceolate, smooth. — Dry woods and hills; rather common. June. — Leaves 2′ – 4′ long, variable on the same plant, sometimes all opposite, rarely with two whorls. Umbels 2 – 5; peduncles 1′ – 1½′ long: the flowers rather small (corolla-lobes 2½″ long), but handsome.

8. **A. parviflòra,** Pursh. (SMALL-FLOWERED MILKWEED.) *Nearly smooth;* the stems (1° – 2° high) *persistent, or slightly woody towards the base,* slender; *leaves lanceolate,* tapering to both ends, petioled, *all opposite;* umbels somewhat panicled, pedicels much shorter than the peduncle; *flowers white* tinged with purplish (the buds 1″ long); divisions of the corolla ovate; the *slender incurved horn longer than the hood.* — Barrens, Green River, Kentucky (*Short*), and southward. July.

9. **A. obtusifòlia,** Michx. (WAVY-LEAVED MILKWEED.) *Smooth and glaucous; stem* simple (2° – 3° high), *bearing a single terminal umbel on a long naked peduncle* (3′ – 12′ long); *leaves oblong or ovate-elliptical, very obtuse* but mucronate (2′ – 5′ long), *sessile and partly clasping by a heart-shaped base, the margins wavy;* pedicels very numerous, elongated; divisions of the *(greenish-purple) corolla* oblong; hoods of the crown truncate and somewhat toothed at the summit, shorter than the slender awl-pointed horn; pods smoothish. — Sandy woods and fields: not rare. July. — Flowers large (petals 4″ – 5″ long).

10. **A. rùbra,** L. (RED-FLOWERED MILKWEED.) *Smooth,* slender (1° – 2° high), bearing 1 – 3 *few-flowered umbels at the naked summit of the stem* (on a peduncle 2′ – 3′ long); *leaves ovate-lanceolate or oblong-ovate, tapering to a very sharp point, rounded or slightly heart-shaped at the base, very short-petioled;* divisions of the *corolla (reddish-purple) lanceolate, acute;* hoods of the crown oblong, acutish (purple tinged with orange), with an awl-shaped and slightly incurved short horn; pods smooth. (A. laurifolia, *Michx.* A. acuminata, *Pursh.*) — Low grounds, pine barrens of New Jersey to Virginia and southward. July. — Leaves 2′ – 4′ long, rough-ciliate.

11. **A. paupércula,** Michx. *Very smooth; stem wand-like,* slender (2° – 3° high), *bearing* 1 - *several few-flowered umbels at the summit of a naked* and usually elongated *terminal peduncle* (rarely with one or two lateral ones); *leaves linear, much elongated,* slightly petioled; divisions of the *(purple) corolla linear-oblong,* half the length of the pedicels; hoods of the crown (orange-yellow) spatulate-oblong, much longer than the awl-shaped incurved horn. — Wet pine barrens, New Jersey to Virginia near the coast, and southward. July, Aug. — Leaves 5′ – 10′ long, 1″ – 6″ broad; the flowers large and showy.

++ ++ *Stem paniculately branching.*

12. **A. incarnàta,** L. (SWAMP MILKWEED.) Smooth, or nearly so, the stem with two downy lines above and on the branches of the peduncles (2° – 3° high), very leafy; leaves oblong-lanceolate, acute or pointed, obtuse at the base, distinctly petioled; umbels many-flowered, somewhat panicled, on peduncles half the length of the leaves; divisions of the corolla ovate, reddish

purple; hoods of the crown (flesh-color) ovate, about the length of the ascending or scythe-form awl-shaped horns; pods veiny, smooth. — Varies with the leaves a little heart-shaped at the base, and, in var. PÚLCHRA, with broader and shorter-petioled leaves, *more or less hairy-pubescent*, as well as the stem. (A. pulchra, *Willd.*) — Wet grounds; the smooth form very common northward; the hairy variety more so southward. July, Aug. — Milky juice scanty.

+ + *Leaves alternate-scattered, or the lowest opposite: milky juice little or none.*

13. **A. tuberòsa,** L. (BUTTERFLY-WEED. PLEURISY-ROOT.) Roughish-hairy; stems erect or ascending, very leafy, branching at the summit, and bearing the umbels in a terminal corymb; leaves varying from linear to oblong-lanceolate, sessile or slightly petioled; divisions of the corolla ovate-oblong (greenish-orange); hoods of the crown narrowly oblong, bright orange, scarcely longer than the nearly erect and slender awl-shaped horns; pods hoary. (A. decúmbens, *L.*) — Dry hills and fields; common, especially southward. July – Sept. — Plant 1° – 2° high, leafy to the summit, usually with numerous and corymbed short-peduncled umbels of very showy flowers, which are rather smaller than in No. 1.

+ + + *Leaves nearly all whorled, rarely alternate, crowded.*

14. **A. verticillàta,** L. (WHORLED MILKWEED.) Smoothish; stems slender, simple or sparingly branched, minutely hoary in lines, very leafy to the summit; leaves very narrowly linear, with revolute margins (2′ – 3′ long, 1″ wide), 3 – 6 in a whorl; umbels small, lateral, and terminal; divisions of the corolla ovate (greenish-white); hoods of the crown roundish-oval, about half the length of the incurved claw-shaped horns; pods very smooth. — Dry hills; common, especially southward. July – Sept. — Flowers small.

2. ACERÀTES, Ell. GREEN MILKWEED.

Nearly as in Asclepias; but the pollen-masses more slender, with longer stalks, and the concave upright hoods of the crown destitute of a horn (whence the name, from *a privative* and *κέρας, -ατος, a horn*).

1. **A. viridiflòra,** Ell. Downy-hoary; *stems low and stout*, ascending; leaves varying from oval or obovate to lanceolate or almost linear, slightly petioled, mucronate-acute or obtuse, thick, at length smoothish; *umbels nearly sessile*, densely many-flowered, *globose*, lateral; divisions of the corolla oblong; *hoods of the crown oblong*, strictly erect, *sessile* at the base of the tube of filaments, shorter than the anthers; pods nearly smooth. (Asclepias viridiflora, *Pursh.* A. lanceolata, *Ives.* A. obovata, *Ell.*) — Dry hills and sandy fields; common, especially southward. July – Sept. — Flowers greenish; when expanded, about the length of the pedicel. Leaves singularly variable in form.

2. **A. longifòlia,** Ell. Minutely hoary or rough-hairy; *stem slender*, upright (1° – 2½° high); leaves elongated-linear (3′ – 7′ long, ¼′ – ½′ wide); *umbels peduncled, open*, many-flowered; divisions of the corolla ovate-oblong, several times shorter than the pedicels; *hoods* of the crown *short and rounded, raised on the tube of filaments*; pods smooth. — Moist places, Ohio to Wisconsin and southward. June, July. — Flowers half as large as in the last, tinged with yellowish and purplish.

3. ENSLÉNIA, Nutt. Enslenia.

Calyx 5-parted. Corolla 5-parted; the divisions erect, ovate-lanceolate. Crown of 5 free membranaceous leaflets, which are truncate or obscurely lobed at the apex, where they bear a pair of flexuous awns united at their base. Anthers nearly as in Asclepias: pollen-masses oblong, obtuse at both ends, fixed below the summit of the stigma to the descending glands. Pods oblong-lanceolate, smooth. Seeds with a tuft, as in Asclepias. — A perennial twining herb, smooth, with opposite heart-ovate and pointed long-petioled leaves, and small whitish flowers in raceme-like clusters, on slender axillary peduncles. (Dedicated to *A. Enslen*, an Austrian botanist who collected in the Southern United States early in the present century.)

1. **E. álbida,** Nutt. — River-banks, Ohio to Illinois, W. Virginia, and southwestward; common. July–Sept. — Climbing 8°-12° high: leaves 3′-5′ wide.

4. GONÓLOBUS, Michx. Gonolobus.

Calyx 5-parted. Corolla 5-parted, wheel-shaped, sometimes reflexed-spreading; the lobes convolute in the bud. Crown a small and fleshy wavy-lobed ring in the throat of the corolla. Anthers horizontal, partly hidden under the flattened stigma, opening transversely. Pollen-masses 5 pairs, horizontal. Pods turgid, more or less ribbed, or armed with soft warty projections. Seeds with a silky tuft. — Twining herbaceous or shrubby plants, with opposite heart-shaped leaves, usually hairy, and racemed or corymbed greenish yellow or dingy purple flowers, on peduncles rising from between the petioles. (Name composed of γῶνος, *an angle*, and λοβός, *a pod*, from the angled or ribbed follicles of one species.)

1. **G. macrophýllus,** Michx. Stems and petioles somewhat pubescent and hairy; leaves round-cordate, large, very abruptly pointed; *lobes of the corolla narrow; pods ribbed-angled.* — River-banks, Penn.? to Kentucky, and southward. (The limits between this and G. tiliæfolius, *Decaisne*, appear unsatisfactory.)

2. **G. hirsútus,** Michx. Stems and petioles bristly-hairy; leaves round-cordate or ovate-cordate, more or less hairy; *lobes of the corolla oblong; pods armed with soft prickles.* — River-banks, Penn.? to Kentucky, and southward. July.

5. PERÍPLOCA, L. Periploca.

Calyx 5-parted. Corolla 5-parted, wheel-shaped, with 5 awned scales in the throat. Filaments distinct: anthers coherent with the apex of the stigma, bearded on the back: pollen-masses 5, each of 4 united, singly affixed directly to the glands of the stigma. Stigma hemispherical. Pods smooth, widely divergent. Seeds with a silky tuft. — Twining shrubby plants, with smooth opposite leaves, and panicled-cymose flowers. (Name from περιπλοκή, *a coiling round*, in allusion to the twining stems.)

1. **P. Græca,** L. Leaves ovate or ovate-lanceolate, shorter than the loose-

ly-flowered cymes; divisions of the brownish-purple corolla linear-oblong, very hairy above. — Near Rochester, &c., New York. Aug. (Adv. from Eu.)

ORDER 86. OLEÀCEÆ. (OLIVE FAMILY.)

Trees or shrubs, with opposite and pinnate or simple leaves, a 4-cleft (or sometimes obsolete) calyx, a regular 4-cleft or nearly or quite 4-petalous corolla which is valvate in the bud, sometimes apetalous; the stamens 2–4, mostly 2, and fewer than the lobes of the corolla; the ovary 2-celled, with 2 suspended ovules in each cell. — Seeds anatropous, with a large straight embryo in hard fleshy albumen. — A small family of which the OLIVE is the type, also represented by the LILAC (*Syrìnga vulgàris*, *S. Pérsica*, &c.), and by the ASH, which is usually apetalous.

Synopsis.

TRIBE I. **OLEINEÆ.** Fruit a drupe or berry. Flowers perfect or polygamous, with both calyx and corolla. Leaves simple, mostly entire.

1. LIGUSTRUM. Corolla funnel-form, its tube longer than the calyx, 4-cleft.
2. OLEA. Corolla short, bell-shaped or salver-shaped; the limb 4-parted.
3. CHIONANTHUS. Corolla 4-parted or 4-petalous, the divisions or petals long and linear.

TRIBE II. **FRAXINEÆ.** Fruit dry and winged (a samara). Flowers diœcious or polygamous, mostly apetalous, and sometimes without a calyx. Leaves odd-pinnate.

4. FRAXINUS. The only genus of the Tribe.

TRIBE III. **FORESTIEREÆ.** Fruit a drupe or berry. Flowers diœcious or perfect, apetalous. Leaves simple.

5. FORESTIERA. Flowers diœcious, from a scaly catkin-like bud. Stamens 2–4.

1. LIGÚSTRUM, Tourn. PRIVET.

Calyx short-tubular, 4-toothed, deciduous. Corolla funnel-form, 4-lobed; the lobes ovate, obtuse. Stamens 2, on the tube of the corolla, included. Stigma 2-cleft. Berry spherical, 2-celled, 2–1-seeded. — Shrubs with entire leaves on short petioles, and small white flowers in terminal thyrsoid panicles. (The classical name.)

1. **L. VULGÀRE**, L. (COMMON PRIVET or PRIM.) Leaves elliptical-lanceolate, smooth, thickish, deciduous; berries black. — Used for low hedges: naturalized in copses by the agency of birds in E. New England and New York. May, June. (Nat. from Eu.)

2. ÒLEA, Tourn. OLIVE.

Calyx short, 4-toothed, rarely entire. Corolla with a short bell-shaped tube and a 4-parted spreading limb. Stamens 2. Fruit a drupe, with a bony stone, 2–1-seeded. — Shrubs or trees, with opposite and coriaceous mostly entire leaves, and perfect, or (in our species) polygamous or diœcious, small white flowers in panicles or corymbs. (The classical name of the European Olive, *O. Europæa*.)

1. **O. Americàna,** L. (DEVIL-WOOD.) Leaves oblong-lanceolate, smooth and shining (3′ – 6′ long); fruit spherical. — Moist woods, coast of S. Virginia, and southward. May. Tree 15° – 20° high.

3. CHIONÁNTHUS, L. FRINGE-TREE.

Calyx 4-parted, very small, persistent. Corolla of 4 long and linear petals, which are barely united at the base. Stamens 2 (rarely 3 or 4), on the very base of the corolla, very short. Stigma notched. Drupe fleshy, globular, becoming 1-celled and 1-seeded. — Low trees or shrubs, with deciduous and entire petioled leaves, and delicate flowers in loose and drooping graceful panicles. (Name from χιών, *snow*, and ἄνθος, *blossom*, alluding to the light and snow-white clusters of flowers.)

1. **C. Virgínica,** L. Leaves oval, oblong, or obovate-lanceolate, smoothish or rather downy, veiny; flowers on slender pedicels; drupe purple, with a bloom, ovoid (½′ – ¾′ long). — River-banks, S. Pennsylvania, Virginia, and southward: very ornamental in cultivation. June. — Petals about 1′ long, narrowly linear, acute, rarely 5 – 6 in number.

4. FRÁXINUS, Tourn. ASH.

Flowers polygamous or (in our species) diœcious. Calyx small and 4-cleft, toothed, or entire, or obsolete. Petals 4, slightly cohering in pairs at the base, or only 2, oblong or linear, or altogether wanting in our species. Stamens 2, sometimes 3 or 4: anthers linear or oblong, large. Style single: stigma 2-cleft. Fruit a 1 – 2-celled samara, or *key-fruit* flattened, winged at the apex, 1 – 2-seeded. Cotyledons elliptical: radicle slender. — Light timber-trees, with petioled pinnate leaves of 3 – 15 either toothed or entire leaflets; the small flowers in crowded panicles or racemes from the axils of last year's leaves. (The classical Latin name, thought to be derived from φράξις, *a separation*, from the facility with which the wood splits.)

* *Fruit winged from the apex only, barely margined or terete towards the base: calyx minute, persistent: corolla none: leaflets stalked.*

1. **F. Americàna,** L. (WHITE ASH.) *Branchlets and petioles glabrous;* leaflets 7 – 9, ovate- or lance-oblong, pointed, pale and either smooth or pubescent underneath, somewhat toothed or entire; *fruit terete and marginless below, above extended into a lanceolate, oblanceolate, or wedge-linear wing.* (F. acuminata, and F. juglandifolia, *Lam.* F. epíptera, *Michx.*) — Rich or moist woods; common. April, May. — A large forest tree, with gray furrowed bark, smooth greenish-gray branchlets, and rusty-colored buds. (The figure of the fruit in Michaux's Sylva is misplaced, it apparently having been interchanged with that of the Green Ash.)

2. **F. pubéscens,** Lam. (RED ASH.) *Branchlets and petioles velvety-pubescent;* leaflets 7 – 9, ovate or oblong-lanceolate, taper-pointed, almost entire, pale or more or less pubescent beneath; *fruit acute at the base, flattish and 2-edged,* the edges gradually dilated into the long (1½′ – 2′) *oblanceolate or linear-lanceolate*

wing. (F. tomentosa, *Michx.*) — With the preceding: rare west of the Alleghanies. — A smaller tree, furnishing less valuable timber.

3. **F. viridis,** Michx. f. (GREEN ASH.) *Glabrous throughout; leaflets* **5 – 9**, ovate or oblong-lanceolate, often wedge-shaped at the base and serrate above, *bright green both sides; fruit acute at the base, striate, 2-edged or margined,* gradually dilated into an oblanceolate or linear-spatulate wing, much as in No. 2. (F. cóncolor, *Muhl.* F. juglandifolia, *Willd.*, *DC.*, and *ed.* 1, but not of *Lam.*) — Near streams, New England to Wisconsin and southward; most common westward. — A small or middle-sized tree. (The figure of the fruit given in Michaux's Sylva evidently belongs to F. Americana.)

* * *Fruit winged all round the seed-bearing portion.*

+ *Calyx wanting, at least in the fertile flowers, which are entirely naked!*

4. **F. sambucifòlia,** Lam. (BLACK ASH. WATER ASH.) Branchlets and petioles glabrous; *leaflets* 7 – 11, *sessile*, oblong-lanceolate, tapering to a point, serrate, obtuse or rounded at the base, green and smooth both sides, when young with some rusty hairs along the midrib; fruit linear-oblong or narrowly elliptical, blunt at both ends. — Swamps and along streams, Penn. to Kentucky, and everywhere northward. April, May. — Tree rather small, its tough wood easily separable into thin layers, used for coarse basket-work, &c. Bruised leaves with the odor of Elder.

+ + *Calyx present, persistent at the base of the fruit.*

5. **F. quadrangulàta,** Michx. (BLUE ASH.) *Branchlets square,* at least on vigorous shoots, glabrous; leaflets 7 – 9, short-stalked, oblong-ovate or lanceolate, pointed, sharply serrate, green both sides; *fruit narrowly oblong, blunt, and of the same width at both ends,* or slightly narrowed at the base, often notched at the apex (1½′ long, ¼′ – ⅓′ wide). — Dry or moist rich woods, Ohio and Michigan to Illinois and Kentucky. — Tree large, with timber like No. 1.

6. **F. platycárpa,** Michx. (CAROLINA WATER-ASH.) *Branchlets terete,* glabrous or pubescent; leaflets 5 – 7, ovate or oblong, acute at both ends, short-stalked; *fruit broadly winged* (not rarely 3-winged), *oblong* (½′ wide), *with a tapering base.* — Wet woods, Virginia and southward. March.

5. FORESTIÈRA, Poir. (ADÈLIA, *Michx.*)

Flowers diœcious, crowded in catkin-like scaly buds from the axils of last year's leaves, imbricated with scales. Corolla none. Calyx early deciduous, of 4 minute sepals. Stamens 2 – 4: anthers oblong. Ovary ovate, 2-celled, with 2 pendulous ovules in each cell: style slender: stigma somewhat 2-lobed. Drupe small, ovoid, 1-celled, 1-seeded. — Shrubs, with opposite and often fascicled deciduous leaves and small flowers. Fertile peduncles short, 1 – 3-flowered. (Named for *M. Forestier*, a French physician.)

1. **F. ligustrina,** Poir. Leaves thin, oblong-lanceolate, pointed at both ends, entire. — Wet banks, W. Illinois and southward. April.

DIVISION III. APÉTALOUS EXÓGENOUS PLANTS.

Corolla none; the floral envelopes in a single series (calyx), or sometimes wanting altogether.

ORDER 87. ARISTOLOCHIÀCEÆ. (BIRTHWORT FAM.)

Climbing shrubs, or low herbs, with perfect flowers, the conspicuous lurid calyx (valvate in the bud) coherent below with the 6-celled ovary, which forms a many-seeded 6-celled pod or berry in fruit. Stamens 6 – 12, more or less united with the style: anthers adnate, extrorse. — Leaves petioled, mostly heart-shaped and entire. Seeds anatropous, with a large fleshy raphe, and a minute embryo in fleshy albumen.

1. ÁSARUM, Tourn. ASARABACCA. WILD GINGER.

Calyx regular; the limb 3-cleft or parted. Stamens 12, with more or less distinct filaments, their tips usually continued beyond the anther into a point. Fruit fleshy, globular, bursting irregularly. — Stemless herbs with aromatic-pungent creeping rootstocks bearing 2 – 3 kidney-shaped or heart-shaped leaves on long petioles, and a short-peduncled flower close to the ground. (An ancient name, of obscure derivation.)

§ 1. ASARUM PROPER. — *Calyx-tube wholly coherent with the ovary: filaments slender, united only with the base of the style, much longer than the short anthers: styles united into one, which is barely 6-lobed at the summit, and with 6 radiating thick stigmas: leaves membranaceous, unspotted, on flowering stems mostly a single pair, with the peduncle between them.*

1. **A. Canadénse,** L. Soft-pubescent; leaves kidney-shaped, more or less pointed (4′ – 5′ wide when full grown); calyx bell-shaped, with the upper part of the acute lobes widely and abruptly spreading, brown-purple inside; stamens awn-tipped. — Hill-sides in rich woods; common, especially northward, and along the Alleghanies. April, May.

§ 2. HETERÓTROPA. — *Calyx-tube somewhat inflated below and contracted at the throat, only its base coherent with the lower part of the ovary; the limb 3-cleft, short: filaments very short or none: anthers oblong-linear: styles 6, fleshy, diverging, 2-cleft, each bearing a thick extrorse stigma below the cleft: leaves thickish, persistent, the upper surface often whitish-mottled, alternate on the rootstock: peduncle very short.*

2. **A. Virgínicum,** L. *Leaves round-heart-shaped* (1½′ – 2′ wide); calyx ventricose-bell-shaped; anthers pointless. — Virginia, and southward, in and near the mountains. May.

3. **A. arifòlium,** Michx. *Leaves halberd-heart-shaped* (2′ – 4′ long); calyx oblóng-tubular, with very short and blunt lobes; *anthers obtusely short-pointed.* — Virginia, and southward. May.

2. ARISTOLÒCHIA, Tourn. BIRTHWORT.

Calyx tubular, the tube extended, variously inflated above the ovary, mostly contracted at the throat. Stamens 6, the sessile anthers wholly adnate to the back of the short and fleshy 3-6-lobed or angled stigma. Pod naked, 6-valved. Seeds flat. — Twining, climbing, or sometimes upright perennial herbs or shrubs, with alternate leaves and lateral or axillary greenish or lurid-purple flowers. (Named from its reputed medicinal properties.)

§ 1. *Calyx-tube bent like the letter S, enlarged at the two ends, the small limb obtusely 3-lobed: anthers in pairs (making 4 cells in a row under each of the 3 truncate lobes of the stigma): low herbs.*

1. **A. Serpentària,** L. (VIRGINIA SNAKEROOT.) Stems (8′-15′ high) branched at the base, pubescent; leaves ovate or oblong from a heart-shaped base, or halberd-form, mostly acute or pointed; flowers all next the root, short-peduncled. — A narrow-leaved variety is A. sagittàta, *Muhl.*, A. hirsuta, *Nutt.*, &c. — Rich woods, Connecticut to Indiana and southward; not common except near the Alleghany Mountains. July. — The fibrous, aromatic-stimulant root is well known in medicine.

§ 2. *Calyx-tube strongly curved like a Dutch pipe, contracted at the mouth, the short limb obscurely 3-lobed: anthers in pairs under each of the 3 short and thick lobes of the stigma: twining shrubs: flowers from one or two of the superposed accessory axillary buds.*

2. **A. Sìpho,** L'Her. (PIPE-VINE. DUTCHMAN'S PIPE.) *Glabrous; leaves round-kidney-shaped,* slightly downy underneath; peduncles with a clasping bract; calyx ($1\frac{1}{2}'$ long) with a brown-purple, *abrupt flat border.* — Rich woods, Penn. to Kentucky, and southward, along the mountains. May. — Stems sometimes 2′ in diameter, climbing trees: full-grown leaves 8′-12′ broad.

3. **A. tomentòsa,** Sims. *Downy or soft-hairy; leaves round-heart-shaped,* very veiny (3′-5′ long); *calyx greenish-yellow,* with an *oblique* dark purple *closed orifice* and a rugose *reflexed limb.* — Rich woods, from Southern Illinois southward. June.

ORDER 88. NYCTAGINÀCEÆ. (FOUR-O'CLOCK FAMILY.)

Herbs (or in the tropics often shrubs or trees), with mostly opposite and entire leaves, stems tumid at the joints, a delicate tubular or funnel-form calyx which is colored like a corolla, its persistent base constricted above the 1-celled 1-seeded ovary, and indurated into a sort of nut-like pericarp; the stamens 1-several, slender, and hypogynous; the embryo coiled around the outside of mealy albumen, with broad foliaceous cotyledons. — Represented in our gardens by the common FOUR-O'CLOCK, or MARVEL OF PERU (Miràbilis Jalàpa), in which the calyx is commonly mistaken for a corolla because the cup-like involucre of each flower exactly imitates a calyx; — and by a single

1. OXÝBAPHUS, Vahl. OXYBAPHUS.

Flowers 1 – 5 in the same 5-lobed membranaceous broad and open involucre, which enlarges, and is thin and reticulated in fruit. Calyx with a very short tube and a bell-shaped (rose or purple) deciduous limb, which is plaited in the bud. Stamens mostly 3. Style filiform: stigma capitate. Fruit achenium-like, several-ribbed or angled. — Herbs, with very large and thick perennial roots, opposite leaves, and mostly clustered small flowers. (Name ὀξυβάφον, *a vinegar-saucer*, or small shallow vessel; from the shape of the involucre.)

1. **O. nyctagíneus,** Sweet. Nearly smooth; stem repeatedly forked (1° – 3° high); leaves oblong-ovate, triangular-ovate, or somewhat heart-shaped; involucres 3 – 5-flowered. — Rocky places, from Wisconsin and Illinois southward and westward. June – Aug.

ORDER 89. PHYTOLACCÀCEÆ. (POKEWEED FAMILY.)

Plants with alternate entire leaves and perfect flowers, with nearly the characters of Chenopodiaceæ, *but usually a several-celled ovary composed of as many carpels united in a ring, and forming a berry in fruit;* — represented only by the typical genus

1. PHYTOLÁCCA, Tourn. POKEWEED.

Calyx of 5 rounded and petal-like sepals. Stamens 5 – 30. Ovary of 5 – 12 carpels, united in a ring, with as many short separate styles, in fruit forming a depressed-globose 5 – 12-celled berry with a single vertical seed in each cell. Embryo curved in a ring around the albumen. — Tall and stout perennial herbs, with large petioled leaves, and flowers in racemes which become lateral and opposite the leaves. (Name compounded of φυτόν, *plant*, and the French *lac*, lake, in allusion to the coloring matter resembling that pigment which the berries yield.)

1. **P. decándra,** L. (COMMON POKE or SCOKE. GARGET. PIGEON-BERRY.) Stamens 10: styles 10. — Borders of woods and moist ground; common. July – Sept. — A smooth plant, with a rather unpleasant odor, and a very large poisonous root often 4′ – 6′ in diameter, sending up stout stalks (in early spring sometimes eaten as a substitute for Asparagus), which are at length 6° – 9° high. Calyx white: ovary green; the long racemes of dark-purple berries filled with crimson juice, ripe in autumn.

ORDER 90. CHENOPODIÀCEÆ. (GOOSEFOOT FAMILY.)

Chiefly herbs, of homely aspect, more or less succulent, with chiefly alternate leaves, and no stipules nor scarious bracts, minute greenish flowers, with the free calyx imbricated in the bud; the stamens as many as its lobes, or rarely fewer, and inserted opposite them or on their base; the 1-celled ovary becoming a 1-seeded thin utricle or rarely an achenium in fruit. Embryo *coiled into a ring (around the albumen, when there is any) or spiral.* — Calyx persistent, enclosing the fruit. Styles 2, rarely 3–5. (Mostly inert or innocent plants.)

Synopsis.

I. CYCLOLOBEÆ. Embryo curved like a ring around the albumen.

Tribe I. **CHENOPODIEÆ.** Flowers usually all alike and perfect, or merely polygamous by the want of stamens in some of them. Stem not jointed. Leaves flat. Flowers in racemes, spikes, or panicles. (Fruit enclosed in the calyx.)

1. CYCLOLOMA. Calyx 5-cleft, in fruit surrounded by a horizontal membranaceous wing. Seed horizontal.

2. CHENOPODIUM. Calyx 3–5-cleft or parted, the lobes naked or merely keeled in fruit. Seed horizontal (rarely vertical when the calyx is only 2–3-cleft).

3. ROUBIEVA. Calyx 5-cleft, becoming closed and pod-like in fruit. Utricle glandular-dotted. Seed vertical.

4. BLITUM. Calyx of 3–5 sepals, dry or juicy in fruit. Utricle membranaceous. Seed vertical.

Tribe II. **SPINACIEÆ.** Flowers monœcious or diœcious, and of two distinct sorts: otherwise as in Tribe I.

5. ATRIPLEX. Pair of bracts including the otherwise naked ovary and fruit flat and dilated, often united below. Radicle inferior or lateral.

6. OBIONE. Fruit-bearing bracts united. Radicle superior.

Tribe III. **SALICORNIEÆ.** Flowers all alike and perfect, spiked or in catkins. Stem jointed. Leaves awl-shaped, scale-like, or none.

7. SALICORNIA. Flowers sunk in excavations of the axis. Calyx utricular.

II. SPIROLOBEÆ. Embryo coiled in a spiral: albumen none or little.

Tribe IV. **SUÆDEÆ.** Embryo in a flat spiral. Leaves terete and fleshy.

8. CHENOPODINA. Calyx 5-parted, wingless and hornless. Seed horizontal.

Tribe V. **SALSOLEÆ.** Embryo conical-spiral. Leaves fleshy or spinescent.

9. SALSOLA. Calyx of 5 sepals, in fruit horizontally 5-winged. Seed horizontal.

1. CYCLOLÒMA, Moquin. Winged Pigweed.

Flowers perfect, bractless. Calyx 5-cleft, with the concave lobes strongly keeled, including the depressed fruit, at length appendaged with a broad and continuous horizontal scarious wing. Stamens 5. Styles 3. Seed horizontal, flat. Embryo encircling the mealy albumen. — An annual and much-branched coarse herb, with alternate sinuate-toothed petioled leaves, and small panicled clusters of sessile flowers. (Name composed of κύκλω, *round about*, and λῶμα, *a border*, from the encircling wing of the calyx in fruit.)

1. **C. platyphýllum,** Moquin. (Salsola platyphylla, *Michx.*) — Illinois, on the alluvial banks of the Mississippi, and northwestward.

2. CHENOPÒDIUM, L. Goosefoot. Pigweed.

Flowers perfect, all bractless. Calyx 5-cleft, rarely 2–4-cleft or parted, with the lobes sometimes keeled, but not appendaged nor becoming succulent, more or less enveloping the depressed fruit. Stamens mostly 5: filaments filiform. Styles 2, rarely 3. Seed horizontal (sometimes vertical in Nos. 7 and 9), lenticular: embryo coiled partly or fully round the mealy albumen. — Weeds, usually with a white mealiness, or glandular. Flowers sessile in small clusters collected in spiked panicles. (Name from χήν, *a goose*, and ποῦς, *foot*, in allusion to the shape of the leaves.) — Our species are all annuals (except No. 9?), flowering through the summer, growing around dwellings, in manured soil, cultivated grounds, and waste places.

§ 1. CHENOPODIUM PROPER. — *Smooth or mealy, never pubescent or glandular nor sweet-scented: embryo a complete ring.*

* *Leaves entire: herbage green, sometimes turning purplish, no mealiness: calyx-lobes not keeled nor wholly enclosing the fruit.*

1. **C.** POLYSPÉRMUM, L. Stems slender, ascending; leaves oblong or ovate-oblong, obtuse or acutish, narrowed into a slender petiole. — A scarce garden-weed, about Boston, *C. J. Sprague*. Woods, near Mercersburg and Reading, Penn., *Porter:* the var. SPICATUM (C. acutifolium, *Smith*). (Nat. from Eu.)

* * *Leaves strongly and sharply toothed, green throughout (mealiness obscure or none), on slender petioles: calyx-lobes slightly or not at all keeled, not completely enclosing the ripe fruit (least enclosing in No. 2, most so in No. 4).*

2. **C.** HÝBRIDUM, L. (MAPLE-LEAVED GOOSEFOOT.) Bright green; stem widely much branched (2°–4° high); *leaves thin* (2′–8′ long), somewhat triangular and heart-shaped, taper-pointed, *sinuate-angled*, the angles extended into a *few large and pointed teeth;* racemes diffusely and loosely panicled, leafless; the smooth calyx-lobes keeled; *seed sharp-edged*, the thin pericarp adhering closely to it. — Common. Heavy-scented, like Stramonium. (Nat. from Eu.)

3. **C.** ÚRBICUM, L. Rather pale or dull green, with erect branches (1°–3° high); *leaves* triangular, acute, *coarsely many-toothed; spikes erect, crowded in a long and narrow racemose panicle;* calyx-lobes not keeled; *seed with rounded margins.* — Var. RHOMBIFÒLIUM, Moquin (C. rhombifolium, *Muhl.*), is a form with the leaves more or less wedge-shaped at the base, and with longer and sharper teeth. — Not rare eastward. (Nat. from Eu.)

4. **C.** MURÀLE, L. Ascending, loosely branched (1°–1½° high); *leaves* rhomboid-ovate, acute, coarsely and *sharply unequally toothed*, thin, bright green; *spikes or racemes diverging and somewhat corymbed;* calyx-lobes scarcely keeled; *seed sharp-edged.* — Boston, New York, &c.: rare. (Adv. from Eu.)

* * * *Leaves toothed, repand-angled, or sometimes nearly entire, more or less white-mealy, as well as the flowers: calyx-lobes distinctly keeled, usually (but not always) perfectly enclosing the fruit.*

5. **C.** OPULIFÒLIUM, Schrad. *Leaves round-rhombic, spreading*, long-petioled, very *obtuse*, somewhat 3-lobed, toothed, the upper oblong-lanceolate; racemes panicled, rather loose; *seed with rather obtuse margins.* — Seen from U. S. by Moquin: probably it has been confounded with the next; perhaps justly. (Adv. from Eu.)

6. **C.** ÁLBUM, L. (LAMB'S-QUARTERS. PIGWEED.) *Leaves ascending, varying from rhombic-ovate to oblong-lanceolate*, or the upper *linear-lanceolate, acu*

sparingly or slightly toothed; racemes spiked-panicled, mostly dense; *seed sharp-edged.* — Varies exceedingly in different situations, more or less white-mealy: a narrow and green-leaved variety, with slender racemes, is C. viride, *L.* — Very common. (Nat. from Eu.)

* * * * *Leaves sinuate- or pinnatifid-toothed, white-mealy underneath: calyx-lobes not keeled, not perfectly enclosing the fruit, sometimes only 4 – 2, and then the seed commonly vertical.*

7. **C.** GLAÙCUM, L. (OAK-LEAVED GOOSEFOOT.) Stems ascending or prostrate, much branched (6′ – 12′ high); leaves oblong, obtuse, smooth and pale green above; racemes spiked and simple, dense; seed sharp-edged. — Philadelphia, *Dr. Bromfield.* Lancaster, Penn., *Porter.* Roxbury, Mass., *D. Murray.* (I have seen no specimens.) (Adv. from Eu.)

§ 2. BOTRŸOIS, Moquin. (AMBRINA, Moquin, in part.) — *Not mealy, but more or less viscid-glandular and pleasant-aromatic: seed sometimes vertical when the calyx is only 2 – 3-cleft; embryo forming only ⅔ or ¾ of a ring.*

8. **C.** BÒTRYS, L. (JERUSALEM OAK. FEATHER GERANIUM.) Glandular-pubescent and viscid; leaves slender-petioled, oblong, obtuse, sinuate-pinnatifid; *racemes cymose-diverging, loose, leafless;* fruit not perfectly enclosed; seed obtusely margined. — Escaped from gardens. (Adv. from Eu.)

9. **C.** AMBROSIOÌDES, L. (MEXICAN TEA.) Smoothish; leaves slightly petioled, oblong or lanceolate, repand-toothed or nearly entire, the upper tapering to both ends; *spikes densely flowered, leafy,* or intermixed with leaves; fruit perfectly enclosed in the calyx; seeds obtuse on the margin. — Waste places; common, especially southward. (Nat. from Trop. Amer.) — Passes into

Var. ANTHELMÍNTICUM. (WORMSEED.) *Root perennial* (?); leaves more strongly toothed, the lower sometimes almost laciniate-pinnatifid; *spikes mostly leafless.* (C. anthelmínticum, *L.*) — Common in waste places southward. (Nat. from Trop. Amer.)

3. ROUBIÈVA, Moquin. ROUBIEVA.

Calyx oblong-urn-shaped, 5-toothed, in fruit enclosing the glandular-dotted utricle like a small pod. Filaments short and flat. Seed vertical. Otherwise like Chenopodium, § 2. — A diffusely much-branched perennial, with small 1 – 2-pinnatifid leaves, and axillary clustered flowers. (Named for *G. J. Roubieu,* a French botanical writer.)

1. **R.** MULTÍFIDA, Moquin. (Chenopodium multifidum, *L.*) — Waste places, New York, in and around the city, *J. Carey.* (Adv. from Trop. Amer.)

4. BLÌTUM, Tourn. BLITE.

Flowers perfect, bractless. Calyx 3 – 5-parted, either unchanged or becoming juicy and berry-like in fruit, not appendaged. Stamens 1 – 5: filaments filiform. Styles or stigmas 2. Seed vertical, compressed-globular; the embryo coiled into a ring quite around the albumen. — Herbs, with petioled triangular or halberd-shaped and mostly sinuate-toothed leaves. (The ancient Greek and Latin name of some insipid pot-herb.)

§ 1. MOROCÁRPUS, Mœnch. — *Glabrous annuals or biennials, not mealy: flowers in axillary heads, the upper ones often spiked: calyx in fruit commonly becoming fleshy or berry-like, nearly enclosing the utricle.*

1. **B. marítimum,** Nutt. (Coast Blite.) Stem angled, much branched; leaves thickish, triangular-lanceolate, tapering below into a wedge-shaped base and above into a slender point, sparingly and coarsely toothed, the upper linear-lanceolate; *clusters scattered in axillary leafy spikes; calyx-lobes* 2–4, *rather fleshy;* stamen 1; seed shining, the margin acute. — Salt marshes, New Jersey to Massachusetts; rare. Aug.

2. **B. capitàtum,** L. (Strawberry Blite.) Stem ascending, branching; leaves triangular and somewhat halberd-shaped, sinuate-toothed; *clusters simple* (*large*), *interruptedly spiked,* the upper leafless; stamens 1–5; *calyx berry-like* in fruit; seed ovoid, flattish, smooth, with a very narrow margin. — Dry rich ground, common from W. New York to Lake Superior, and northward. June. — The calyx becomes pulpy and bright red in fruit, when the large clusters look like Strawberries. (Eu.)

§ 2. AGATHÓPHYTON, Moquin. *Somewhat mealy: root perennial: flowers in clusters crowded in a terminal spike: calyx not fleshy, shorter than the half-naked fruit.*

3. **B.** Bonus-Henrìcus, Reichenb. (Good-King-Henry.) Leaves triangular-halberd-form; stamens 5. (Chenopodium, *L.*) — Around dwellings: scarce. (Adv. from Eu.)

5. ÁTRIPLEX, Tourn. Orache.

Flowers monœcious or diœcious; the staminate like the flowers of Chenopodium, only sterile by the abortion of the pistil; the fertile flowers consisting only of a pistil enclosed between a pair of appressed foliaceous (ovate or halberd-shaped) bracts, which are enlarged in fruit, and distinct, or united only at the base. Seed vertical. Embryo coiled into a ring; the radicle inferior and more or less ascending. In one section, to which the Garden Orache belongs, there are also fertile flowers with a calyx, like those of Chenopodium but without stamens, and with horizontal seeds. — Herbs usually mealy or scurfy with bran-like scales, with triangular or halberd-shaped angled leaves, and spiked-clustered flowers. (The ancient Latin name, of obscure meaning.)

1. **A. hastàta,** L. Erect or diffusely spreading, much branched, more or less scurfy; leaves alternate or partly opposite, petioled, triangular and halberd form, commonly somewhat toothed, the uppermost lanceolate and entire; fruiting bracts triangular or ovate-triangular, acute, entire, or 1–2-toothed below, often somewhat contracted at the base, so becoming rather rhomboidal, the flat faces either smooth and even, or sparingly muricate. ① (A. hastata & laciniata, *Pursh.* A. Purshiana. *Moquin.* A. pátula, *ed.* 1. &c.) — Salt marshes, brackish river-banks, &c., Virginia to Maine. The plant on the shore is more scurfy and hoary; more inland it is greener and thinner-leaved. (Eu.)

A. horténsis, L., the Garden Orache, is said by Pursh to be spontaneous in fields and about gardens. I have never seen it growing wild: it is rarely cultivated as a pot-herb.

6. OBIÒNE, Gærtn. OBIONE.

Flowers nearly as in Atriplex, but the more or less united bracts investing the fruit often inflexed or indurated and pod-like; the radicle superior and projecting. Herbaceous or shrubby. (Origin of the name unknown, unless from the river *Obi*, in Siberia, whence the original species came.)

1. **O. arenària,** Moquin. (SAND ORACHE.) Silvery-mealy, diffusely spreading; leaves oblong, narrowed at the base, nearly sessile; bracts of the fruit broadly wedge-shaped, flat, united, 2–3-toothed at the summit, and with a few prickly points on the sides. ① — Sea-beach, Massachusetts to Virginia, and southward. August.

7. SALICÓRNIA, Tourn. GLASSWORT. SAMPHIRE.

Flowers perfect, 3 together, sessile and immersed in hollows of the thickened upper joints, forming spikes; the two lateral sometimes sterile. Calyx small and bladder-like, with a toothed or torn margin, at length spongy and narrowly wing-bordered, enclosing the flattened fruit. Stamens 1–2: styles 2, partly united. Seed vertical, with the embryo coiled or bent into a ring. — Herbaceous or somewhat shrubby low saline plants, with succulent leafless jointed stems, and opposite branches; the flower-bearing branchlets forming the spikes. (Name composed of *sal*, salt, and *cornu*, a horn; saline plants with horn-like branches.)

1. **S. herbàcea,** L. *Annual, erect or ascending* (6′–12′ high), much branched; *the joints* somewhat thickened at their summit, and *with two short and blunt or notched teeth; spikes elongated, tapering but rather obtuse at the apex.* — Salt marshes of the coast, and at Salina, New York, and other interior salt springs. Aug. (Eu.)

2. **S. mucronàta,** Lag.? Bigelow. *Annual, erect,* sparingly branched (4′–8′ high); the *joints 4-angled at the base, and with 2 ear-like ovate and pointed teeth* at their summit; *spikes short and thick, obtuse.* (S. Virginica, *Nutt.*, not of *L.*) — Salt marshes, Maine to New York. Sept. — Plant turning deep crimson in autumn. (Eu.?)

3. **S. ambígua,** Michx. *Perennial,* herbaceous, or a little woody, *procumbent or creeping, lead-colored,* with flexuous ascending branches (3′–6′ high); the *joints truncate,* dilated upward, flattish, *slightly and obtusely 2-toothed.* — Sea-beach, Massachusetts to Virginia, and southward. Sept.

8. CHENOPODÌNA, Moquin. SEA GOOSEFOOT.

Flowers perfect, solitary or clustered in the axils of the leaves. Calyx 5-parted, not appendaged, fleshy, becoming somewhat inflated and closed over the fruit (utricle). Stamens 5. Stigmas 2 or 3. Seed horizontal, with a flat-spiral embryo, dividing the scanty albumen into 2 portions. — Fleshy maritime plants, with alternate nearly terete linear leaves. (Name altered from Chenopodium.)

1. **C. marítima,** Moquin. Annual, smooth, diffusely much branched; leaves slender (1′ long), acute; calyx-lobes keeled; seed sharp-edged. (Chenopodium maritimum, *L.* Suæda, *Moquin*, formerly.) — Salt marshes along the sea-shore. Aug. (Eu.)

9. SALSÒLA, L. Saltwort.

Flowers perfect, with 2 bractlets. Calyx 5-parted, persistent and enclosing the depressed fruit in its base; its divisions at length horizontally winged on the back, the wings forming a broad and circular scarious border. Stamens mostly 5. Styles 2. Seed horizontal, without albumen, filled by the embryo, which is coiled in a conical spiral (cochleate). — Herbs, or slightly shrubby branching plants, of the sea-shore, with fleshy and rather terete or awl-shaped leaves, often spiny-tipped, and sessile axillary flowers. (Name from *sal*, salt; in allusion to the alkaline salts these plants copiously contain.)

1. **S. Kàli,** L. (Common Saltwort.) Annual, diffusely branching, rough or smoothish; leaves alternate, awl-shaped, prickly-pointed; flowers single; calyx with the converging lobes forming a sort of beak over the fruit, the large rose or flesh-colored wings nearly orbicular and spreading. — Sandy sea shore; common. August. — A very prickly bush-like plant. (Eu.)

Bèta vulgàris, the Beet, with its varieties, the *Scarcity* and *Mangel Wurtzel*, — and Spinàcia oleràcea, the Spinach, — well-known esculent plants, also belong to this family.

Order 91. AMARANTÀCEÆ. (Amaranth Family.)

Weedy herbs, with nearly the characters of the last family, but the flowers mostly imbricated with dry and scarious persistent bracts, often colored, commonly 3 in number; the one-celled ovary many-ovuled in one tribe. (The greater part of the order tropical, but several have found their way northward as weeds.)

Synopsis.

Tribe I. **ACHYRANTHEÆ.** Anthers 2-celled. Ovary 1-ovuled. Utricle 1-seeded.

* Flowers monœcious or sometimes perfect.

1. AMARANTUS Calyx of 5 or 3 sepals, and 3-bracted. Fruit opening transversely (circumcissile); the upper part falling away.
2. EUXOLUS. Calyx mostly of 3 sepals. Fruit indehiscent or bursting irregularly.

* * Flowers diœcious: calyx none in the fertile flowers.

3. MONTELIA. Fruit a thin and even utricle, opening transversely, as in No. 1. Stigmas long, plumose-hairy.
4. ACNIDA. Fruit 3 – 5-angled and fleshy, indehiscent.

Tribe II. **GOMPHRENEÆ.** Anthers 1-celled. Ovary and fruit as in Tribe I

5. IRESINE. Calyx of 5 sepals. Stamens united below into a cup.
6. FRŒLICHIA. Calyx 5-cleft at the apex. Filaments united throughout into a tube.

1. AMARÁNTUS, Tourn. Amaranth.

Flowers monœciously polygamous, 3-bracted. Calyx of 5, or rarely 3, equal erect sepals, glabrous. Stamens 5, rarely 3, separate: anthers 2-celled. Stigmas 2 or 3. Fruit an ovoid 1-seeded membranaceous utricle, 2 – 3-beaked at the apex, mostly longer than the calyx, opening transversely all round, the upper part falling away as a lid. Embryo coiled into a ring around the albumen. — Annual weeds, of coarse aspect, with alternate and entire petioled leaves, and small green or purplish flowers in axillary or terminal spiked clusters. (Name compounded of *α* privative, *μαραίνω*, *to fade*, and *ἄνθος*, *flower*, because the dry calyx and bracts do not wither. The Romans, like the Greeks, wrote Amarantus, which the early botanists incorrectly altered to *Amaranthus*.) — No species is really indigenous in the Northern United States.

§ 1. *Flowers in terminal and axillary, simple or mostly panicled spikes: stem erect (1°-6° high): leaves long-petioled: stamens and sepals 5.*

* *Flowers, much-branched panicles, &c., crimson or purple-tinged: the leaves (4'-10' long) mostly partaking of the same color: stem unarmed.*

1. **A.** HYPOCHONDRÌACUS, L. (PRINCE'S FEATHER.) Smooth or smoothish; leaves oblong-lanceolate, acute or pointed; *spikes very obtuse*, thick, crowded, the terminal one elongated; *bracts long-awned; fruit* 2-3-*cleft at the apex*, longer than the calyx. — Rarely spontaneous around gardens. (Virginia, ex *L.*; but doubtless adv. from Trop. Amer.)

2. **A.** PANICULÀTUS, L. (PRINCE'S FEATHER. RED AMARANTH, &c.) Stem mostly pubescent; leaves oblong-ovate or ovate-lanceolate; *spikes acutish*, erect or spreading, rather dense, the terminal one not much larger; *bracts awn-pointed; fruit* 2-3-*toothed* at the apex, longer than the calyx. — Flowers green, tinged with red, or sometimes deep red or purple. (A. sanguineus, *L.*) — In gardens, &c. (Adv. from Trop. Amer.)

* * *Flowers, &c. green: stem unarmed.*

3. **A.** HÝBRIDUS, L. (GREEN AMARANTH. PIGWEED.) *Leaves* ovate-oblong or ovate, acute, smooth, *bright green*, spikes erect, obtuse, in loosely branched panicles, the terminal one longer; bracts awned, sometimes tinged reddish; *fruit* 2-3-*cleft at the apex, nearly smooth, not exceeding the calyx.* Waste places and gardens; common. (Virginia, *L.*; but nat. from Trop. Amer.)

4. **A.** CHLOROSTÀCHYS, Willd. *Leaves bright deep green*, long-petioled, ovate or rhombic-ovate; spikes ascending, acute, crowded in an open panicle, the terminal one long and often nodding; *bracts awn-pointed, rather longer than the calyx, which is shorter than the* 2-3-*toothed rugose fruit.* — Around dwellings, southward. Perhaps (with the preceding) no more than a variety of the next. (Adv. from Trop. Amer.)

5. **A.** RETROFLÈXUS, L. (PIGWEED.) Roughish and pubescent; *leaves pale or dull green*, or rather glaucous, long-petioled, ovate or rhombic-ovate, undulate; spikes crowded in a stiff panicle, acutish, more or less spreading, green, the terminal one shortish and erect; *bracts pointed, twice the length of the calyx, which is longer than the rugose fruit.* — Around dwellings, in manured soils. (Adv. from Trop. Amer.)

* * * *Flowers, &c. greenish: stem armed with* 2 *spines in the axils of the leaves.*

6. **A.** SPINÒSUS, L. (THORNY AMARANTH.) Smooth, bushy-branched; stem reddish; leaves rhombic-ovate or ovate-lanceolate, dull green; terminal spike elongated; calyx about equalling the bracts and the fruit. — Waste places Pennsylvania, Ohio, and southward. (Adv. from Trop. Amer ?)

§ 2. *Flowers crowded in close and small axillary clusters: stems spreading or ascending: stamens and sepals 3, or the former only 2.*

7. **A.** ALBUS, L. Smooth, pale green (½′–2′ high); *stems whitish*, mostly spreading next the ground; leaves long-petioled, obovate and spatulate-oblong, very obtuse or retuse; flowers greenish; sepals mucronate, half the length of the rugose fruit, much shorter than the rigid pungently pointed bracts.—Waste grounds, near towns, and road-sides: common. (Nat. from Trop. Amer.?)

A. MELANCHÓLICUS, L., cultivated under the fanciful name of LOVE-LIES-BLEEDING, is not spontaneous.

2. EÚXOLUS, Raf. FALSE AMARANTH.

Flowers monœcious, or rarely perfect, 3-bracted. Calyx of 3–5 erect glabrous sepals. Stamens 2–5, mostly 3. Stigmas 3. Fruit an ovate and often rather fleshy 1-seeded utricle, which does not open or bursts irregularly. Otherwise much as in Amarantus. (Name said by the author to mean "well shut," probably formed illegitimately of *εὖ*, *very*, and *ὅλος*, *whole* or *entire*.)

1. **E.** LIVIDUS, L. *Smooth, livid-purple;* stem thick, much branched; leaves ovate or oval, long-petioled; axillary spikes or heads dense, much shorter than the petioles, the terminal elongated; *sepals* 3, much longer than the bracts, *rather shorter than the rugose fruit.* ① (Amarantus lividus, *L.*)—Coast of Virginia (according to Linnæus), and southward. (Adv. from Trop. Amer.?)

2. **E.** DEFLÉXUS, Raf. *Minutely pubescent;* stems decumbent, or ascending with deflexed branches (1° high); leaves rhombic-lanceolate; spikes oblong-cylindrical; *sepals mostly* 3, *shorter than the smooth acutish fruit.* (Amarantus deflexus, *L.*)—Waste places, Albany, New York, &c. (Adv. from Eu.)

3. **E. pùmilus,** Raf. (DWARF AMARANTH.) Low, *very smooth, rather fleshy; leaves* ovate, obtuse, *slightly petioled,* often purple-veined, mostly crowded at the end of the spreading branches; flowers greenish and purple, in small axillary clusters; bracts short, pointless; stamens and *sepals* 5, the latter *half the length of the* ovate obscurely *5-ribbed thickish fruit* (which is not circumcissile, as figured in Fl. N. Y.) (Amarantus pumilus, *Raf.*, *Nutt.*)—Sandy sea-shore, Long Island to Virginia and southward. Aug., Sept.

3. MONTÈLIA, Moquin (under ACNIDA).

Flowers diœcious, 2–3-bracted. Staminate flowers of 5 thin oblong and mucronate-tipped sepals, longer than the bracts, and as many stamens with oblong anthers; the cells of the latter united only at the middle. Pistillate flowers without any calyx, the lanceolate awl-pointed bracts longer than the 1-ovuled ovary: stigmas 2–4, very long, bristle-awl-shaped, plumose-hispid. Fruit a thin and membranaceous globular utricle, smooth and even, opening transversely around the middle; the upper part falling off like a lid. Radicle of the annular embryo inferior.—An annual glabrous herb, mostly tall and erect, with lanceolate or oblong-ovate alternate leaves, on long petioles, and small clusters of greenish flowers, mostly crowded into elongated and panicled interrupted spikes. (Probably a personal name.)

1. **M. tamariscina.** (Amarantus tamariscinus, *Nutt.*, & *ed.* 1. A. altissimus & Miamensis, *Riddell.* Acnida altissima, *Michx. herb.* A. rusocarpa, *Moquin*, &c.) — Low grounds and moist sandy shores, Vermont to Wisconsin, Illinois, and southward, especially westward. Aug., Sept. — Var. CONCATENÀTA is a form with the lower clusters in the fertile plant forming thickish distant heads (⅓'-½' in diameter) in the axils of the leaves; the stems often low and spreading or decumbent. — A very variable plant, as to inflorescence, height (1°-6° high), the size and shape of the leaves (1'-5' long, the petioles often of the same length), the bracts more or less awl-shaped, equalling or exceeding the fruit (which is that of Amarantus): but all are forms of one species. The sterile plant is Acnida rusocarpa, *Michx.*, or was mixed with it in Michaux's collection, but not the fertile; for the fruit of the present plant is neither obtuse-angled, rugose, nor indehiscent. Besides, that name is unmeaning. In establishing this genus, therefore, as Moquin clearly would have done had he examined the ripe fruit, I adopt Nuttall's specific name.

4. ACNÌDA, L. WATER-HEMP.

Fruit a fleshy and indehiscent utricle, 3-5-angled, the angles often rugose or tubercled-crested. Stigmas 3-5, shorter than the ovary, linear-awl-shaped. Flowers in rather loose panicled spikes. Otherwise as in the last genus. (Name formed of *a* privative and κνίδη, *a nettle.*)

1. **A. cannábina,** L. Leaves elongated-lanceolate or ovate-lanceolate, long-petioled; fruit globular (1½''-2'' long), much exceeding the pointless bracts. ① — Salt-marshes on the coast, Massachusetts to Virginia and southward. Aug.-Oct. — Plant 3°-6° high. — Probably the only species; for A. rusocarpa, *Michx.*, is certainly to be divided between this and Montelia tamariscina; and A. tuberculata, *Moquin*, is likely to be one or the other.

5. IRESÌNE, P. Browne. IRESINE.

Flowers mostly polygamous or diœcious, 3-bracted. Calyx of 5 sepals. Stamens mostly 5: filaments slender, united into a short cup at the base: anthers 1-celled, ovate. Fruit a globular utricle, not opening. — Herbs, with opposite petioled leaves, and minute scarious white flowers crowded into clusters or spiked and branching panicles, the calyx, &c. often bearing long wool (whence the name, from εἰρεσιώνη, a branch entwined with fillets of wool borne in processions at festivals.)

1. **I. celosioides,** L. Nearly glabrous, erect, slender (2°-4° high); leaves ovate-lanceolate; panicles narrow, naked; bracts and calyx silvery-white, the latter woolly at the base. ① — Dry banks, Ohio, Kentucky, and southward. Sept.

6. FRŒLÍCHIA, Mœnch. (OPLOTHÈCA, *Nutt.*)

Flowers perfect, 3-bracted. Calyx tubular, 5-cleft at the summit, below 2-5-crested lengthwise or tubercled and indurated in fruit, and enclosing the closed thin utricle. Filaments united into a tube, bearing 5 oblong 1-celled anthers, and as many sterile strap-shaped appendages. — Hairy or woolly herbs, with opposite sessile leaves, and spiked scarious-bracted flowers. (Named for *J. A. Frölich*, a German botanist of the last century.)

1. **F. Floridàna,** Moquin. Stem leafless above (1° – 2° high); leaves lanceolate, silky-downy beneath; spikelets crowded into an interrupted spike; calyx very woolly. ① — Illinois, in Mason and Cass Counties, *Mead*. Aug. — Perhaps of recent and casual introduction: for elsewhere it is only found much farther south.

GOMPHRÈNA GLOBÒSA, L., is the common GLOBE AMARANTH of the gardens.

ORDER 92. POLYGONÀCEÆ. (BUCKWHEAT FAMILY.)

Herbs, with alternate leaves, furnished with stipules in the form of sheaths (ochreæ) *above the swollen joints of the stem; the flowers mostly perfect, with a more or less persistent calyx, a 1-celled ovary bearing* 2 – 3 *styles or stigmas, and a single erect orthotropous seed.* Embryo curved or straightish, on the outside of the albumen, or rarely in its centre; the radicle pointing from the hilum and to the apex of the dry seed-like fruit. Stamens 4 – 12, inserted on the base of the 3 – 6-cleft calyx. Leaves usually entire. (The watery juice often acrid, sometimes agreeably acid, as in Sorrel; the roots, as in Rhubarb, sometimes cathartic.) — Our few genera all belong to the POLYGONEÆ PROPER.

Synopsis.

* Sepals mostly 5, somewhat equal, all erect in fruit.

1. POLYGONUM. Embryo narrow, curved around one side of the albumen: cotyledons slender or flat.
2. FAGOPYRUM. Embryo in the albumen, its very broad cotyledons twisted-plaited.

* * Sepals 4 - 6, the outer row reflexed, the inner erect and enlarging.

3. OXYRIA. Sepals 4. Stigmas 2. Fruit 2-winged, samara-like.
4. RUMEX. Sepals 6. Styles 3. Fruit 3-angled, wingless, enclosed in the enlarged inner sepals

1. POLÝGONUM, L. KNOTWEED.

Calyx mostly 5-parted; the divisions often petal-like, all erect in fruit, withering or persistent and surrounding the lenticular or 3-angular achenium. Stamens 4 – 9. Styles or stigmas 2 – 3. Embryo placed in a groove on the outside of the albumen and curved half-way around it; the radicle and usually the cotyledons slender. — Pedicels jointed. (Name composed of πολύ, *many*, and γόνυ, *knee*, from the numerous joints.)

§ 1. BISTÓRTA, Tourn. — *Calyx petal-like, deeply 5-cleft: stamens* 8 *or* 9 : *styles* 3. *slender: achenium 3-sided: stems low and simple from a woody creeping rootstock: flowers in a spike-like raceme.*

1. **P. vivíparum,** L. (ALPINE BISTORT.) Smooth, dwarf (4′ – 8′ high), bearing a linear spike of flesh-colored flowers (or often little red bulblets

in their place); leaves lanceolate. — Alpine summits of the White Mountains, New Hampshire, shore of Lake Superior, and northward. (Eu.)

§ 2. AMBLYÓGONON, Meisn. — *Calyx petal-like, 5-parted: stamens 7: style 2-cleft: stigmas capitate: achenium lenticular (cotyledons incumbent, linear: albumen floury): annuals: flowers crowded in linear-cylindrical terminal spikes.*

2. **P.** ORIENTÀLE, L. (PRINCE'S FEATHER.) Tall, branching, rather hairy; leaves ovate, pointed, petioled; upper sheaths salver-form; spikes numerous, nodding; the large bright rose-colored flowers open. — Sparingly escaped from cultivation into waste grounds. Aug., Sept. (Adv. from Eu.)

§ 3. PERSICÀRIA, Tourn. — *Calyx petal-like, 5-parted: stamens 4-8: styles 2-3 or 2-3-cleft: stigmas capitate, often small: achenium lenticular, or (when there are 3 stigmas) 3-sided (cotyledons accumbent, narrow: albumen hard and horny): roots fibrous: sheaths cylindrical, truncate: flowers crowded in spikes or spike-like racemes.*

* *Sheaths naked: styles 2, or 2-cleft: achenium flat or lenticular.*

+ *Stamens 5: spike mostly solitary, very dense: flowers rose-red: root perennial.*

3. **P. amphíbium,** L. (WATER PERSICARIA.) Leaves elliptical-lanceolate or oblong, pointed or obtusish, either narrowed or rather heart-shaped at the base. — Var. 1. AQUÁTICUM, *L.*, is floating or procumbent in soft mud, rooting, and nearly smooth, as well as the long-petioled often obtuse floating leaves. (P. coccíneum, *Bigel.* P. flùitans, *Eaton.*) — Var. 2. TERRÉSTRE is more or less hairy or bristly, with an upright or ascending stem, growing in marshy or muddy places; the leaves acute or pointed, upper very short-petioled. — Ponds or their low borders; common, especially northward. July, Aug. — Very variable in foliage, &c.: spike oblong, 1'-3' long, ½'-¾' thick. (Eu.)

+ + *Stamens 6 or 8: spikes somewhat panicled, oblong or linear, densely flowered: flowers rose or flesh-color: root annual.*

4. **P. nodòsum,** Pers., var. **incarnàtum.** Stem upright (2°-4° high), smooth below, the *branches above, peduncles, &c. roughened with scattered sessile glands; leaves* rough on the midrib and margins, elongated-lanceolate (4'-10' long, 1'-3' wide below), tapering gradually from towards the base to a narrow point; *spikes linear, nodding,* becoming slender (1½'-3' long); *stamens* 6; *style 2-parted, both included;* achenium with concave sides. (P. incarnatum, *Ell.* P. lapathifolium, *Amer. auth.*) — Moist places, Michigan to Kentucky, and common southward. Aug.-Sept. — Sheaths rather long, perfectly smooth and naked on the margin. — This is not P. lapathifolium, but falls under P. nodosum as the species are lately distinguished by Meisner: our plant is apparently indigenous, and so different from the European that it should perhaps be admitted as a species under Elliott's name.

5. **P. Pennsylvánicum,** L. Stem upright (1°-3° high), smooth below, the *branches above, and especially the peduncles, beset with bristly-stalked glands;* leaves lanceolate, a little rough on the midrib and margins (1½'-5' long); *spikes oblong, obtuse* (1'-2' long), *erect, thick; stamens mostly* 8, *somewhat exserted; style 2-cleft;* achenium with flat sides. — Moist soil, in open waste places; common. July-Oct.

* * *Sheaths ciliate or fringed with bristles.*

+- *Root annual: stamens 6 – 8: styles most commonly 2: achenium mostly flat.*

6. **P. Càreyi,** Olney. Stem much branched, upright (3° – 5° high), *glandular-bristly;* leaves lanceolate, bristly on the midrib and margins; *spikes elongated, cylindrical, drooping, on long bristly-glandular peduncles,* rather dense (1′ – 4′ long); stamens 6 – 8; style 2-parted; fruit lenticular, tumid, very smooth and shining. — Shaded swamps, Vermont to Mass. and Rhode Island, and doubtless westward. Aug., Sept. — Leaves 4′ – 10′ long, roughish. Flowers rose-purple, somewhat tinged with green.

7. **P.** PERSICÀRIA, L. (LADY'S THUMB.) Stem smooth (12′ – 18′ high); leaves lanceolate, pointed, roughish, *usually marked with a dark triangular or lunar spot* near the middle; *spikes ovoid or oblong, dense, erect, on smooth* (or at least not glandular) *peduncles* (1′ long); stamens mostly 6; *styles half* 2 – 3*-cleft;* fruit gibbous-flattened or rarely triangular, smooth and shining. ① — Waste and damp places; very common. July, Aug. — Flowers greenish-purple. Plant not acrid. (Nat. from Eu.)

8. **P.** HYDROPÌPER, L. (SMART-WEED.) Smooth (1° – 2° high), *very acrid;* leaves lanceolate, pellucid-dotted; *spikes slender, but short, loosely flowered, greenish, drooping; calyx dotted* with pellucid glands; stamens mostly 6; *styles* 2 – 3*-parted;* fruit minutely striate, dull or little shining, flat or flattish, or obtusely triangular. — Moist or wet grounds, mostly in waste places. Aug., Sept. (Nat. from Eu.)

+- +- *Root perennial* (*or mostly so*): *stamens* 8: *styles* 3: *achenium sharply triangular, smooth and shining.* (*Stems often decumbent or creeping at the base and rooting from the joints: spikes few or single.*)

9. **P. àcre,** H. B. K. (WILD SMART-WEED.) *Smooth,* or nearly so (1° – 3° high); leaves lanceolate, *pellucid-dotted; spikes very slender, erect, interrupted below, whitish or flesh-color; calyx dotted* with pellucid glands; style 3-parted. (P. punctatum, *Ell.* P. hydropiperoides, *Pursh.*) — Wet places; common, especially southward.

10. **P. hydropiperoìdes,** Michx. (MILD WATER-PEPPER.) Stem smooth (1° – 3° high), the narrow sheaths hairy, fringed with rather long bristles; *leaves roughish or appressed-pubescent, not acrid,* narrowly lanceolate, tapering to both ends; *spikes rather slender, erect* (1′ – 2½′ long), *rose-color; calyx not glandular-dotted;* style half 3-cleft. (P. mite, *Pers.*, not of *Schrank.*) — Wet places, and in shallow water; common, especially southward. Aug.

§ 4. AVICULÀRIA, Meisn. — *Calyx more or less petal-like,* 5*-parted: stamens* 8, *sometimes* 3 – 6; *the filaments awl-shaped,* 3 *of them broader at the base: stigmas* 3, *globose, nearly sessile: achenium* 3*-sided* (*cotyledons incumbent: albumen horny*): *commonly annuals, smooth and axillary, with small leaves: flowers sometimes crowded in interrupted spikes along the leafless summit of the branches.*

* *Flowers truly axillary,* 2 – 3 *together, or rarely solitary: sheaths usually* 2 – 3*-parted and cut-fringed or torn.*

11. **P. aviculàre,** L. (KNOTGRASS. GOOSE-GRASS. DOOR-WEED.) *Prostrate or spreading; leaves sessile,* lanceolate or oblong, pale; *flowers apparently*

sessile greenish-white, sometimes tinged with purple); sheaths much shorter than the lower leaves; stamens 5 or 8; *fruit enclosed in the calyx, dull, minutely wrinkled-striate or granular* under a lens. ① — Waste places and gravelly banks, everywhere the commonest weed. (Eu.)

Var. **eréctum,** Roth. Stems upright or ascending; leaves broader (oblong or oval) and larger; stamens commonly 5. (P. eréctum, *L.*) — In richer soil or more shaded places; common.

Var. **littoràle,** Link. Prostrate, very short-jointed; leaves elliptical-lanceolate or narrowly oblong, thickened, glaucous; the sheaths larger in proportion; fruit longer than the calyx, smooth. ① (P. maritimum, *Ray*, &c. P. glaucum, *Nutt.* P. Roberti, *Lois.*) — Sandy sea-beach, Rhode Island to Virginia. Probably a mere state of P. aviculare altered by salt water. (Eu.)

12. **P. ramosíssimum,** Michx. Stems *erect or ascending,* much branched (2°–4° high), rigid, many-striate; *leaves* lanceolate or linear, *tapering into a petiole; sheaths mostly short;* flowers greenish-white (yellowish in drying); stamens commonly 6; *fruit smooth and shining,* partly protruded from the calyx. ① — Sandy shores and banks of streams, Michigan to Illinois and southward. Salt marshes, Rhode Island, *Olney.* Aug. – Oct. — Larger leaves 2' long.

13. **P. ténue,** Michx. (Slender Knotgrass.) *Stem slender, upright, sparingly branched* (6'–12' high), sharp-angled; *leaves sessile, narrowly linear,* very acute; sheaths capillary fringed; flowers greenish-white; *fruit smooth and shining.* ① — Dry soil, and rocky hills; rather common. July – Sept.

* * *Flowers solitary from the axils of closely approximated or imbricated truncate bracts, forming many-jointed terminal spikes: sheaths cylindrical, naked, entire.*

14. **P. articulàtum,** L. (Jointweed.) Stem upright, paniculately branched (4'–12' high), slender; leaves linear-thread-form, deciduous; flowers crowded in slender and spike-like panicled racemes, on recurved pedicels twice the length of the joint-like bracts (bright rose-color); fruit smooth and shining. — Dry, sandy soil; common along the coast, along all the Great Lakes, and in intermediate places in New York. Aug. — Singular for its many-jointed spikes or racemes, which are 1'–3' long; the lower bracts tooth-pointed on one side. — Not a Polygonella!

§ 5. TOVÀRIA, Adans. — *Calyx rather herbaceous (greenish), unequally 4-parted: stamens* 5: *styles* 2, *distinct, rigid and persistent on the smooth lenticular achenium (cotyledons oblong, accumbent): perennial: flowers loosely disposed in a naked long and slender spike.*

15. **P. Virginiànum,** L. Almost smooth; stem angled, upright (2°–4° high); leaves ovate, or the upper ovate-lanceolate, taper-pointed, rounded at the base, short-petioled, rough-ciliate (3'–6' long); sheaths cylindrical, truncate, hairy and fringed; flowers 1–2 from each bract, somewhat curved, the styles in fruit obliquely bent down, minutely hooked at the tip. — Thickets in rich soil; common. Aug.

§ 6. TINIÀRIA, Meisn. — *Calyx 5-parted (rarely 4-parted): stamens mostly* 8: *styles or capitate stigmas* 3, *and achenium 3-sided, or, in No.* 16, *styles* 2 *and ache-*

nium lenticular: annuals, with heart-shaped or arrow-shaped petioled leaves: sheaths semicylindrical.

* *Stems flaccid, not twining, but somewhat climbing or supported on other plants by the reflexed prickles which beset the angles of the stem and petioles: divisions of the (pale rose-colored or white) calyx not keeled: bracts chaff-like.*

16. **P. arifòlium**, L. (HALBERD-LEAVED TEAR-THUMB.) *Stem grooved-angled; leaves halberd-shaped,* taper-pointed, *long-petioled;* flowers somewhat racemed (few); peduncles glandular-bristly; calyx often 4-parted; *stamens* 6; *styles* 2, very short; fruit lenticular (large). — Low grounds. Aug.

17. **P. sagittàtum**, L. (ARROW-LEAVED TEAR-THUMB.) *Stem 4-angled; leaves arrow-shaped, short-petioled;* flowers capitate; peduncles smooth; *stamens mostly* 8; *styles* 3, slender; fruit sharply 3-angled. — Low grounds; common. July – Sept. — Slender, smooth except the angles of the stem and midrib beneath: these are armed with a line of fine and very sharp saw-toothed prickles, which cut the hand drawn against them.

* * *Stems twining, not prickly: calyx (greenish tinged with white or rose-color) with the 3 outer divisions keeled, at least in fruit: flowers in loose panicled racemes: bracts like the stipules.*

18. P. CONVÓLVULUS, L. (BLACK BINDWEED.) *Stems* twining or procumbent (1° – 2° long), *roughish, the joints naked;* leaves halberd-heart-shaped, pointed; flowers in small interrupted corymbose racemes; *outer calyx-lobes keeled;* fruit smoothish. — Cultivated and waste grounds; common. July, Aug. (Nat. from Eu.)

19. **P. cilinòde**, Michx. *Minutely downy; the sheaths fringed* at the base with reflexed bristles; leaves heart-shaped and slightly halberd-shaped, taper-pointed; racemes panicled; *calyx-lobes obscurely keeled;* fruit very smooth and shining. — Copses and rocky hills; New England and Penn. to Wisconsin, and northward. July – Sept. — Stems climbing 3° – 9° high.

20. **P. dumetòrum**, L. (CLIMBING FALSE BUCKWHEAT.) *Smooth; sheaths naked;* leaves heart-shaped or slightly halberd-shaped, pointed; racemes interrupted, leafy; the 3 outer *calyx-lobes strongly keeled and in fruit winged,* the wings often broad, sometimes very narrow; fruit smooth and shining. (P. scándens, *L.*) — Moist thickets; common. Aug. — Stems twining 8° – 12° high over bushes. (Eu.)

2. FAGOPỲRUM, Tourn. BUCKWHEAT.

Calyx petal-like, equally 5-parted, withering and nearly unchanged in fruit. Stamens 8. Styles 3: stigmas capitate. Achenium 3-sided, longer than the calyx. Embryo large, in the centre of the albumen which it divides into 2 parts, with very broad and foliaceous plaited and twisted cotyledons. — Annuals, with triangular-heart-shaped or halberd-shaped leaves, semicylindrical sheaths, and corymbose racemes or panicles of white flowers, often tinged with green or rose-color. (Name φηγός, *the beech,* and πυρός, *wheat,* from the shape of the grain being that of the beech-nut; whence also the English name *Buck*wheat, from the German Buche, *beech.*)

1. **F. esculéntum**, Mœnch. (Buckwheat.) Smoothish; flower with 8 honey-bearing yellow-glands interposed between the stamens; the fruit acute and entire. (Polygonum Fagopyrum, *L.*) — Old fields, remaining as a weed where the plant has been cultivated, and escaping into copses. June – Sept. (Adv. from Eu.)

3. OXÝRIA, Hill. Mountain Sorrel.

Calyx herbaceous, of 4 sepals; the two outer smaller and spreading, the two inner broader and erect (but unchanged) in fruit. Stamens 6. Stigmas 2, sessile, tufted. Achenium lenticular, thin, flat, much larger than the calyx, surrounded by a broad and veiny wing. Seed flattened in the opposite direction from the wing. Embryo straight, occupying the centre of the albumen, slender. — Low alpine perennials, with round-kidney-form and long-petioled leaves chiefly from the root, obliquely truncate sheaths, and small greenish flowers clustered in panicled racemes on a slender scape. (Name from ὀξύς, *sour*, in allusion to the acid flavor of the leaves, similar to that of Sorrel.)

1. **O. digyna,** Campd. Leaves all round-kidney-form, usually notched at the end; fruit orbicular. — Alpine region of White Mountains, New Hampshire, *Oakes*, &c., and high northward. (Eu.)

4. RÙMEX, L. Dock. Sorrel.

Calyx of 6 sepals; the 3 outer herbaceous, sometimes united at the base, spreading in fruit; the 3 inner (called *valves*) larger, somewhat colored, increasing after flowering and convergent over the 3-angled achenium, veiny, often bearing a grain-like tubercle on the outer surface. Stamens 6. Styles 3: stigmas tufted. Embryo slightly curved, lying along one side of the albumen, slender. — Coarse herbs, with small and homely (mostly green) flowers, which are crowded and commonly whorled in panicled racemes; the petioles somewhat sheathing at the base. (The ancient Latin name of these plants; of unknown etymology.)

§ 1. LÁPATHUM, Tourn. — *Flowers perfect, or monœciously polygamous: styles free: herbage bitter.*

* *Leaves all lanceolate and acute at both ends, flat, smooth: valves of the fruiting calyx entire, or nearly so, not awn-bearing: root perennial.*

1. **R. verticillàtus,** L. (Swamp Dock.) Racemes nearly leafless, elongated, the flowers in crowded whorls; fruit-bearing *pedicels slender, club-shaped, abruptly reflexed*, 3 – 4 *times longer than the fruiting calyx; the valves dilated-rhomboid, obtusely somewhat pointed, strongly rugose-reticulated, each bearing a very large grain*, from ½ to ⅓ the width of the valve. — Wet swamps and ditches; common. June, July. — Stem 2° – 4° high, branched above, with pale green, willow-like, thickish, wholly entire leaves. — R. Británnica, *L.*, I now suspect to be founded upon this same species.

2. **R. altissimus,** Wood. (Tall Dock.) Racemes spike-like and panicled, nearly leafless (3° – 6° high); whorls crowded; *pedicels nodding, rather shorter than the fruiting calyx; the valves round-heart-shaped, obtuse*, thin, 1 – 3 *of*

them unequally grain-bearing. (R. Britannica, *ed.* 1.) — Banks of streams, &c., New England? New York (Peekskill, *Mead*) to Illinois and westward. June, July. — Leaves 3′-5′ long mostly oblong-lanceolate, much like the last; the valves fully twice as large, two of the grains small or abortive, or sometimes all three wanting.

3. **R. salicifòlius,** Weinmann, Hook. (WILLOW DOCK.) Racemes spiked, somewhat leafy below; the whorls much crowded; *pedicels shorter than the fruiting calyx; the valves ovate, obtusish,* rugose-reticulated, (1-2 or) all of them *nearly covered with a large and thick grain.* (R. pállidus, *Bigelow.*) — Low grounds, coast of Massachusetts, and northward and northwestward. June. — Stems 1°-3° high, ascending. Leaves thinner than in the two preceding, their margins a little wavy. Fruiting calyx smaller than in No. 1, so short-pedicelled and crowded as to appear sessile.

4. **R. Hydrolápathum,** Hudson, var.? **Americànum.** (GREAT WATER-DOCK.) Racemes upright in a large compound panicle, nearly leafless; whorls crowded; *pedicels capillary, nodding, about twice the length of the fruiting calyx; the valves broadly ovate or roundish, obtuse* (large), all grain-bearing; *leaves oblong-lanceolate, pointed, with minutely crenulate-wavy margins.* (R. Britannica, *Pursh*? *Bigel.*, &c. R. aquaticus, *Smith, Pursh.*) — Wet places, New England to Penn. and Michigan. July. — Stem 5° high, stout. Lower leaves 1° or more long and 3′-5′ wide, the stout midrib produced into a flat petiole. Valves thin, ¼′ long, rather denticulate, much more rounded in our specimens than in European. — Probably a distinct species, allied to R. Patientia.

* * *Leaves more or less wavy-margined, the lower heart-shaped at the base: whorls in panicled racemes or spikes: valves entire or short-toothed: perennials: all introduced.*

5. **R.** OBTUSIFÒLIUS, L. (BITTER DOCK.) Stem roughish; *lowest leaves ovate-heart-shaped, obtuse,* rather downy on the veins underneath, somewhat wavy-margined, the *upper oblong-lanceolate, acute; whorls loose and distant; valves ovate-halberd-shaped, sharply denticulate at the base,* strongly reticulated, one of them principally grain-bearing. — Fields, &c.; a rather common weed. July. (Nat. from Eu.)

6. **R.** CRÍSPUS, L. (CURLED DOCK.) Smooth; *leaves with strongly wavy-curled margins, lanceolate,* acute, the lower truncate or rather heart-shaped at the base; *whorls crowded in prolonged wand-like racemes, leafless above; valves round-heart-shaped, obscurely denticulate* or entire, one or all of them grain-bearing. — A very common weed in cultivated and waste grounds. Stem 3°-4° high, from a deep spindle-shaped yellow root. (Nat. from Eu.)

7. **R.** CONGLOMERÀTUS, Murray. (SMALLER GREEN DOCK.) *Leaves oblong,* pointed, slightly wavy-margined, the lower heart-shaped at the base; *whorls distant, leafy;* pedicels very short; *valves linear-oblong, rather broader next the base; obtuse, entire,* each bearing a single (reddish) grain. (R. acutus, *Smith,* &c.) — Moist places; sparingly introduced. (Nat. from Eu.)

8. **R.** SANGUÍNEUS, L. (BLOODY-VEINED DOCK.) *Leaves lanceolate,* wavy-margined, the lowest heart-shaped at the base; *whorls distant, in long and slender leafless interrupted spikes;* pedicels very short; *valves narrowly oblong,*

broadest above their middle, obtuse, entire, one at least grain-bearing; veins of the leaf red, or, in var. VÍRIDIS, green. — Waste and cultivated grounds. (Nat. from Eu.)

* * * *Leaves linear-lanceolate, wavy-margined; the lower ones auricled or somewhat heart-shaped at the base: valves awn-toothed: low annuals.*

9. **R. marítimus,** L. (GOLDEN DOCK.) Minutely pubescent, diffusely branched; *whorls excessively crowded* in leafy and compact or interrupted spikes; *valves* rhombic-oblong, lance-pointed, each *bearing* 2 – 3 *long awn-like bristles on each side,* and a large grain on the back. (Also R. persicarioìdes, *L.*) — Sea-shore, Virginia to Massachusetts, and in saline soil in the interior. Aug., Sept. — Plant 6′ - 12′ high; remarkable for the crowded and almost orange-colored fruiting calyx, beset with bristles which are usually longer than the width of the valves. (Eu.)

§ 2. ACETOSÉLLA, Tourn. — *Flowers diœcious: styles adherent to the angles of the ovary: herbage acid.*

10. **R.** ACETOSÉLLA, L. (FIELD or SHEEP SORREL.) Low; leaves lance-halberd-form, at least those of the root, the narrow lobes entire; whorls leafless, in slender panicled racemes; valves scarcely enlarging in fruit, ovate, not grain-bearing. ♃ — An abundant weed in waste places and all sterile and worn fields. May. — The fertile panicles usually turn reddish in summer. (Nat. from Eu.)

RHÈUM RHAPÓNTICUM is the PIE RHUBARB, so commonly cultivated for the sake of its fleshy and acid esculent leaf-stalks.

ORDER 93. LAURÀCEÆ. (LAUREL FAMILY.)

Aromatic trees or shrubs, with alternate simple leaves mostly marked with minute pellucid dots, and flowers with a regular calyx of 4 – 6 *colored sepals, which are barely united at the base, imbricated in* 2 *rows in the bud, free from the* 1*-celled and* 1*-ovuled ovary, and mostly fewer than the stamens: anthers opening by* 2 – 4 *uplifted valves.* — Flowers clustered. Style single. Fruit a 1-seeded berry or drupe. Seed anatropous, suspended, with no albumen, filled by the large almond-like embryo. — A well-marked family, very numerous in the tropics, represented in our district by only five species.

Synopsis.

* Flowers perfect: stamens 12, three of them sterile.

1. **PERSEA.** Calyx persistent. Anthers 4-celled, those of 3 stamens turned outward.

* * Flowers diœcious or diœciously polygamous: stamens 9

2. **SASSAFRAS** Flowers destitute of any involucre. Anthers 4-celled, 4-valved.
3. **BENZOIN.** Flowers developed from a 4-leaved involucre. Anthers 2-celled, 2-valved.
4. **TETRANTHERA.** Flowers from a 2 - 4-leaved involucre. Anthers 4-celled, 4-valved.

1. PÉRSEA, Gærtn. ALLIGATOR PEAR.

Flowers perfect, with a 6-parted calyx, which persists at the base of the berry-like fruit. Stamens 12, in four rows, the 3 of the innermost row sterile and reduced to a sort of glands: the rest bearing 4-celled anthers (i. e. each of the two proper cells is divided transversely into two), opening by as many uplifted valves; the anthers of 3 stamens turned outward, the others introrse. — Trees, with persistent entire leaves and small panicled flowers. (An ancient name of some Oriental tree.)

1. **P. Carolinénsis,** Nees. (RED BAY.) Hoary at least when young with a fine down; leaves oblong, pale, soon becoming smooth above; peduncle bearing few flowers in a close cluster; sepals downy, the outer shorter; berries dark blue, on a red stalk. (Laurus Carolinensis, *Catesb.* L. Borbonia, *L.*) — Swamps, Delaware, Virginia, and southward. May. — A small tree.

2. SÁSSAFRAS, Nees. SASSAFRAS.

Flowers diœcious, with a 6-parted spreading calyx; the fertile kind with 9 stamens inserted on the base of the calyx in 3 rows, the 3 inner with a pair of stalked glands at the base of each; anthers 4-celled, 4-valved: fertile flowers with 6 short rudiments of stamens and an ovoid ovary. Drupe ovoid (blue), supported on a club-shaped and rather fleshy (reddish) pedicel. — Trees, with spicy-aromatic bark, very mucilaginous twigs and foliage; the latter deciduous, often lobed. Flowers greenish-yellow, naked, in clustered and peduncled corymbed racemes, appearing with the leaves. Buds scaly. (The popular name, of Spanish origin.)

1. **S. officinàle,** Nees. Leaves ovate, entire, or some of them 3-lobed, soon glabrous. (Laurus Sassafras, *L.*) — Rich woods; common, especially eastward. April. — Tree 15° - 50° high, with yellowish-green twigs.

3. BENZÒIN, Nees. WILD ALLSPICE. FEVER-BUSH.

Flowers polygamous-diœcious, with a 6-parted open calyx; the sterile kind with 9 stamens in 3 rows, the inner ones 1 - 2-lobed and gland-bearing at the base; anthers 2-celled and 2-valved: fertile flowers with 15 - 18 rudiments of stamens in 2 forms, and a globular ovary. Drupe obovoid, red, the stalk not thickened. — Shrubs, with entire deciduous leaves, and honey-yellow-flowers in almost sessile lateral umbel-like clusters appearing before the leaves; the clusters composed of smaller clusters or umbels, each of 4 - 6 flowers and surrounded by an involucre of 4 deciduous scales. (Named from the aroma, which has been likened to that of *benzoin.*)

1. **B. odoríferum,** Nees. (SPICE-BUSH. BENJAMIN-BUSH.) *Nearly smooth; leaves oblong-obovate,* pale underneath. (Laurus Benzoin, *L.*) — Damp woods; rather common. March, April.

2. **B. melissæfòlium,** Nees. Young branches and buds *pubescent; leaves oblong, obtuse or heart-shaped* at the base, downy beneath; umbels few. (Laurus melissæfolia, *Walt.* L. diospyroides, *Michx.*) — Low grounds, Virginia and southward. April.

4. TETRANTHÈRA, Jacq. TETRANTHERA.

Flowers diœcious, with a 6-parted deciduous calyx; the sterile ones with 9 stamens in 3 rows; the anthers all introrse, 4-celled, 4-valved: fertile flowers with 12 or more rudiments of stamens and a globular ovary. — Drupe globular. — Shrubs or trees, with entire leaves and small flowers in axillary clustered umbels. (Name composed of τέτρα, *four*, and ἀνθηρά, *anther*.)

1. **T. geniculàta**, Nees. (POND SPICE.) Flowers (yellow) appearing before the deciduous oblong leaves, which are hairy on the midrib beneath; branches forked and divaricate, the branchlets zigzag; involucres 2-4-leaved, 2-4-flowered; fruit red. (Laurus geniculata, *Michx.*) — Swamps, Virginia and southward. April.

ORDER 94. THYMELEÀCEÆ. (MEZEREUM FAMILY.)

Shrubs, with acrid and very tough (not aromatic) bark, entire leaves, and perfect flowers with a regular and simple colored calyx, bearing usually twice as many stamens as its lobes, free from the 1-*celled and* 1-*ovuled ovary*, which forms a berry-like drupe in fruit, with a single suspended anatropous seed. Embryo large and almond-like: albumen little or none. — A small family, represented in North America only by a single species, of the genus

1. DÍRCA, L. LEATHERWOOD. MOOSE-WOOD.

Calyx petal-like, tubular-funnel-shaped, truncate, the border wavy or obscurely about 4-toothed. Stamens 8, long and slender, inserted on the calyx above the middle, protruded, the alternate ones longer. Style thread-form: stigma capitate. Drupe oval (reddish). — A much-branched bush, with jointed branchlets, oval-obovate alternate leaves, at length smooth, deciduous, on very short petioles, the bases of which conceal the buds of the next season. Flowers light yellow, preceding the leaves, 3 in a cluster from a bud of 3 dark-hairy scales, forming an involucre, from which soon after proceeds a leafy branch. (Δίρκη, the name of a fountain near Thebes, applied by Linnæus to this North American genus, for no imaginable reason, unless because the bush frequently grows near mountain rivulets.)

1. **D. palústris**, L. — Damp rich woods, seldom in swamps; New England to Penn., Kentucky, and (especially) northward. April. — Shrub 2°-5° high; the wood white, soft, and very brittle; but the fibrous bark remarkably tough, used by the Indians for thongs, whence the popular names. In N. New England also called *Wicopy*.

ORDER 95. ELÆAGNÀCEÆ. (OLEASTER FAMILY.)

Shrubs or small trees, with silvery-scurfy leaves and mostly diœcious flowers; further distinguished from the Mezereum Family by the ascending albuminous seed, and the calyx-tube becoming pulpy and berry-like in fruit, enclosing the achenium; and from the following by the calyx-tube not cohering with the ovary, &c. A small family, represented east of the Mississippi solely by one species of

1. SHEPHÉRDIA, Nutt. SHEPHERDIA.

Flowers diœcious; the sterile with a 4-parted calyx (valvate in the bud) and 8 stamens, alternating with as many processes of the thick disk; the fertile with an urn-shaped 4-cleft calyx, enclosing the ovary (the orifice closed by the teeth of the disk), and becoming berry-like in fruit. Style slender: stigma 1-sided. — Leaves opposite, entire, deciduous; the small flowers nearly sessile in their axils on the branchlets, clustered, or the fertile solitary. (Named for *John Shepherd*, formerly curator of the Liverpool Botanic Garden.)

1. **S. Canadénsis,** Nutt. (CANADIAN SHEPHERDIA.) Leaves elliptical or ovate, nearly naked and green above, silvery-downy and scurfy with rusty scales underneath; fruit yellowish-red. — Rocky or gravelly banks, W. Vermont to Wisconsin and northward. May. — A straggling shrub, 3° - 6° high; the branchlets, young leaves, yellowish flowers, &c., covered with the rusty scales. Fruit insipid.

S. ARGÉNTEA, Nutt., the BUFFALO-BERRY of Upper Missouri, which has narrower leaves, silvery on both sides, and edible, acid, scarlet fruit, is somewhat cultivated for ornament.

ELÆÁGNUS ARGÉNTEA, Pursh, the SILVER-BERRY, may perhaps be found within our northwestern limits.

ORDER 96. SANTALÀCEÆ. (SANDALWOOD FAMILY.)

Herbs, shrubs, or trees, with entire leaves; the 4 - 5-cleft calyx valvate in the bud, its tube coherent with the 1-celled ovary, which contains 2 - 4 ovules suspended from the apex of a stalk-like free central placenta which rises from the base of the cell, but the (indehiscent) fruit always 1-seeded. — Seed destitute of any proper seed-coat. Embryo small, at the apex of copious albumen: radicle directed upward: cotyledons cylindrical. Stamens equal in number to the lobes of the calyx, and inserted opposite them into the edge of the fleshy disk at their base. Style 1. A small order, the greater part belonging to warm regions, here represented only by the two following genera.

1. COMÁNDRA, Nutt. BASTARD TOAD-FLAX.

Flowers perfect. Calyx bell-shaped or soon urn-shaped, lined above the ovary with an adherent disk which has a 5-lobed free border. Stamens inserted on the edge of the disk between its lobes, opposite the lobes of the calyx, to the middle of which the anthers are connected by a tuft of threads. Fruit drupe-like or nut-like, crowned by the persistent calyx-lobes, the cavity filled by the globular seed. — Low and smooth perennials, with herbaceous stems from a rather woody base or root, alternate oblong and sessile leaves, and greenish-white flowers in terminal or axillary small umbel-like clusters. (Name from *κόμη, hair*, and *ἄνδρες*, for *stamens*, in allusion to the hairs attached to the anthers.)

1. **C. umbellàta,** Nutt. *Peduncles several and corymbose-clustered at the summit of the stem, several-flowered;* calyx-tube conspicuously continued beyond the ovary, forming a neck to the globular-urn-shaped fruit; the *lobes oblong; style slender;* fruit dry. — Dry ground; common. May, June. — Stems 8′–10′ high, very leafy. Root forming parasitic attachments to the roots of trees (as shown by *Mr. Stauffer*). Leaves obovate-oblong, about 1′ long.

2. **C. lìvida,** Richards. *Peduncles axillary,* 3–5-*flowered,* shorter than the oval flaccid leaves; calyx-tube not continued beyond the ovary, *the lobes ovate; style short;* fruit pulpy when ripe, red. — Shore of Lake Superior, and northward. — Leaves larger than in the last.

2. PYRULÀRIA, Michx. OIL-NUT. BUFFALO-NUT.

Flowers diœcious. Calyx 5-cleft, the lobes recurved. Sterile flowers with 5 stamens on very short filaments, alternate with 5 rounded glands. Fertile flowers with a pear-shaped ovary invested by the adherent calyx, naked at the flat summit: disk with 5 glands: style short and thick: stigma capitate-flattened. Fruit fleshy and drupe-like, pear-shaped, the globose endocarp thin. Embryo small: albumen very oily. — A low straggling shrub, with alternate short-petioled and veiny deciduous leaves; the small greenish flowers sessile in very short and simple terminal spikes. (Name a diminutive of *Pyrus,* from the fruit, which looks like a small pear.)

1. **P. oleìfera.** (P. pùbera, *Michx.* Hamiltònia oleifera, *Muhl.*) — Rich wooded banks, mountains of Penn. and southward throughout and near the Alleghanies. May. — Leaves obovate-oblong, pointed at both ends, a little downy, or at length smooth, somewhat succulent, oily, acrid to the taste. Spikes ripening but one fruit, which is about 1′ long.

ORDER 97. LORANTHÀCEÆ. (MISTLETOE FAMILY.)

Shrubby plants with coriaceous greenish foliage, parasitic on trees, represented in the northern temperate zone chiefly by the Mistletoe and its near allies; which are distinguished from the preceding family more by their parasitic growth and habit, and by their more reduced flowers, than by essential characters: represented by

1. PHORADÉNDRON, Nutt. FALSE MISTLETOE.

Flowers diœcious, in short and catkin-like jointed spikes, usually several under each short and fleshy bract or scale, and sunk in the joint. Calyx globular, 3- (rarely 2–4-) lobed: in the staminate flowers a sessile anther is borne on the base of each lobe, and is transversely 2-celled, each cell opening by a pore or slit: in the fertile flowers the calyx-tube adheres to the ovary: stigma sessile, obtuse. Berry 1-seeded, pulpy. Embryo small, half imbedded in the summit of mucilaginous albumen. — Yellowish-green woody parasites on the branches of trees, with jointed much branched stems, thick and firm persistent leaves (or only scales in their place), and axillary small spikes of flowers.

(Name composed of φώρ, *a thief*, and δένδρον, *tree*; because these plants steal their food from the trees they grow upon.)

1. **P. flavéscens,** Nutt. (AMERICAN MISTLETOE.) Leaves obovate or oval, somewhat petioled, longer than the spikes in their axils, yellowish; berries white. (Viscum flavescens, *Pursh.*) — New Jersey to Illinois and southward, preferring Elms and Hickories. April.

ORDER 98. SAURURÀCEÆ. (LIZARD'S-TAIL FAMILY.)

Herbs, with jointed stems, alternate entire leaves with stipules, and perfect flowers in spikes, entirely destitute of any floral envelopes, and 3 – 5 more or less united ovaries. — Ovules few, orthotropous. Embryo heart-shaped, minute, contained in a little sac at the apex of the albumen. — A kind of offshoot of the Pepper Family (tropical), and represented only by

1. SAURÙRUS, L. LIZARD'S-TAIL.

Stamens mostly 6 or 7, hypogynous, with long and distinct filaments. Fruit somewhat fleshy, wrinkled, of 3 – 4 pistils united at the base, with recurved stigmas. Seeds usually solitary, ascending. — A perennial marsh herb, with heart-shaped petioled leaves, and white flowers, each from the axil of a small bract, crowded in a slender wand-like and naked peduncled terminal spike (its appearance giving rise to the name, from σαῦρος, *a lizard*, and οὐρά, *tail*).

1. **S. cérnuus,** L. — Margins of ponds, &c.; common. June. — Spike 3′ – 6′ long, drooping at the end.

ORDER 99. CERATOPHYLLÀCEÆ. (HORNWORT FAM.)

Aquatic herbs, with whorled finely dissected leaves, and minute axillary and sessile monœcious flowers without any floral envelopes, but with an 8 – 12-cleft involucre in place of a calyx, the fertile a simple 1-celled ovary, with a suspended orthotropous ovule: seed filled by a highly developed embryo with 4 cotyledons! and a conspicuous plumule. — Consists only of the genus

1. CERATOPHÝLLUM, L. HORNWORT.

Sterile flowers of 12 – 24 stamens with large sessile anthers. Fruit an achenium, beaked with the slender persistent style. — Herbs growing under water, in ponds or slow-flowing streams: the sessile leaves cut into *thrice-forked* thread-like rather rigid divisions. (Name from κέρας, *a horn*, and φύλλον, *leaf*.)

1. **C. demérsum,** L. — Var. COMMÙNE has a smooth marginless fruit beaked with a long persistent style, and with a short spine or tubercle at the base on each side. — Var. ECHINÀTUM (C. echinatum, *Gray*) has the fruit mostly larger (3″ long), rough-pimpled on the sides, the narrowly winged margin spiny-toothed. — Slow streams and ponds; common, but rare in fruit. Probably there is only one species. (Eu.)

ORDER 100. CALLITRICHÀCEÆ. (WATER-STARWORTS.)

Aquatic small annuals, with opposite entire leaves, and solitary polygamous flowers in their axils, without any proper floral envelopes, and with a 4-lobed and 4-celled 4-seeded fruit; — consisting only of the genus

1. CALLÍTRICHE, L. WATER-STARWORT.

Stamen solitary, in the sterile flowers between a pair of bracts; in the fertile, placed between the pistil and the stem, and rarely also one on the outer side: filament thread-like: anther heart-shaped, by confluence becoming 1-celled. Fruit indehiscent, nut-like, 4-lobed and 4-celled; but the styles only 2, awl-shaped and distinct. Seed solitary and suspended, filling each cell, anatropous: embryo slender, in the axis and nearly the length of the albumen. Foliage very variable according to circumstances, as in most water-plants. (Name from καλός, *beautiful*, and θρίξ, *hair*, from the almost capillary and usually tufted stems.)

1. **C. vérna,** L. *Fruit sessile* or nearly so, with *a pair of bracts at its base;* lobes of the fruit keeled or slightly winged on the back; floating leaves obovate or spatulate and narrowed into a petiole, the immersed ones linear, rarely all linear or all spatulate-obovate. — Shallow water; very common. April – Aug. (Eu.)

Var. **platycárpa** (C. platycarpa, *Kützing*), has the fruit twice as large and more wing-margined. (Var. TERRÉSTRIS is a state growing along the margin of pools or brooks, procumbent, tufted, and small-leaved.) (Eu.)

2. **C. pedunculàta,** DC. *Fruit raised on a* (sometimes short) mostly *long and slender peduncle, without bracts;* fruit regularly 4-lobed, the lobes bluntly keeled. — Rare: only observed southwestward. (Eu.)

3. **C. autumnàlis,** L. *Fruit nearly sessile, without bracts;* lobes of the fruit (often irregular) sharply keeled on the back; leaves linear or spatulate. — Not common. (Eu.)

Var. **lineàris** (C. linearis, *Pursh*) has the leaves all or chiefly narrowly linear, and the lobes of the fruit not keeled. — Common northward.

ORDER 101. PODOSTEMÀCEÆ. (RIVER-WEED FAMILY.)

Aquatics, growing on stones in running water, with much the aspect of Sea-weeds *or* Mosses; *the minute naked flowers bursting from a spathe-like involucre as in* Liverworts, *producing a 2 – 3-celled many-seeded ribbed pod;* — represented in North America by the genus

1. PODOSTÈMON, Michx. RIVER-WEED.

Flower solitary, pedicelled, from a tubular sac-like involucre, destitute of floral envelopes. Stamens borne on one side of the stalk of the ovary, with their long filaments united into one for more than half their length, and 2 short sterile filaments, one on each side: anthers 2-celled. Stigmas 2, awl-shaped.

Pod oval, 8-ribbed, 2-celled, 2-valved. Seeds minute, very numerous on a thick persistent central placenta, destitute of albumen. — Leaves 2-ranked. (Name from ποῦς, *foot*, and στήμων, *stamen;* the two stamens being apparently raised on a stalk by the side of the ovary.)

1. **P. ceratophýllum,** Michx. Leaves rigid, dilated into a stipule-like sheathing base, above mostly forked into thread-like or linear lobes. — Not uncommon in the bottom of shallow streams. July – Sept. A small olive-green plant, of firm texture, resembling a Sea-weed, tenaciously attached to loose stones, in the manner of a *Fucus,* by fleshy disks or processes in place of roots.

ORDER 102. EUPHORBIÀCEÆ. (SPURGE FAMILY.)

Plants usually with a milky acrid juice, and various, usually monœcious or diœcious flowers; the fruit of 2 – 3 *or several* 1 – 2*-seeded pods united around a central axis, separating when ripe* (*rarely of a single pod*). Seed suspended, anatropous. Embryo with flat cotyledons nearly as long as the albumen. Stigmas 2 – 3 or more, often forked. Calyx usually valvate in the bud, occasionally wanting. Petals sometimes present. — A large family in the warmer parts of the world (the acrid juice poisonous); most numerously represented in Northern countries by the genus Euphorbia, which has very remarkable reduced flowers enclosed in an involucre that imitates a calyx; and sparingly by a few other genera: the tribes not yet well settled. The proper place for the order is in the Polypetalous division.

Synopsis.

* Seeds and ovules only one in each cell.

+ Staminate and pistillate flowers, both destitute of calyx as well as corolla, and contained in the same cup-shaped involucre, which resembles a calyx.

1. EUPHORBIA. Staminate flowers many (each merely of a single stamen) enclosed in the involucre, the single pistillate flower projecting from it on its stalk. Pod 3-lobed.

+ + Flowers (monœcious) of both kinds with a calyx, but no petals, not in an involucre.

2. CNIDOSCOLUS. Flowers cymose. Calyx corolla-like, in the staminate flowers salver-shaped, 5-cleft. Stamens 10 – 15.
3. ACALYPHA. Flowers spiked and glomerate. Stamens 8 - 16: filaments monadelphous at the base. Styles capillary-dissected.
4. TRAGIA. Flowers in racemes. Stamens 2 or 3. Style 3-cleft. Stigmas 3, simple.
5. STILLINGIA. Flowers in a terminal spike. Stamens 2. Stigmas 3, simple.

+ + + Flowers (monœcious) of both kinds with a regular calyx, and at least the staminate with petals also, not in an involucre.

6. CROTON. Flowers spiked or glomerate. Ovary and fruit 3- (rarely 2-) celled.
7. CROTONOPSIS. Flowers scattered on the branchlets, axillary. Ovary and fruit 1-celled.

* * Seeds and ovules 2 in each cell. (Calyx present, but no petals.)

8. PHYLLANTHUS. Flowers axillary. Calyx 5 - 6-parted. Stamens 3, monadelphous.
9. PACHYSANDRA. Flowers spiked. Calyx 4-parted. Stamens 4, separate.

1. EUPHÓRBIA, L. SPURGE.

Flowers monœcious, included in a cup-shaped 4 – 5-lobed involucre (*flower* of older authors) resembling a calyx or corolla, usually bearing large and thick glands at its sinuses. Sterile flowers numerous and lining the base of the involucre, each from the axil of a little bract, and consisting merely of a single stamen jointed on a pedicel like the filament: anther-cells globular, separate. Fertile flower solitary in the middle of the involucre, soon protruded on a long pedicel, consisting of a 3-lobed and 3-celled ovary with no calyx, or a mere vestige. Styles 3, each 2-cleft; the stigmas therefore 6. Pod separating into 3 one-seeded carpels, which split elastically into 2 valves. Seed often caruncled. — Plants (herbs in the United States), with a milky acrid juice, the uppermost leaves often in whorls or pairs. Peduncles lateral or terminal, often umbellate-clustered. (Named after *Euphorbus*, physician to King Juba.)

For the following elaboration of the genus I am indebted to DR. ENGELMANN.

§ 1. *Leaves (all opposite and similar, small) furnished with awl-shaped or scaly stipules: stems much branched: involucres solitary in the forks or axils, sometimes crowded or clustered on the branchlets: root annual in all our species: plants flowering all the summer and autumn.* (Stipulàtæ.)

* *Seeds smooth and even, ash-colored: leaves entire, glabrous, as is the whole plant, and pale or slightly glaucous.*

1. **E. polygonifòlia,** L. (SHORE SPURGE.) Prostrate-spreading; *leaves oblong-linear,* obtuse, mucronate, slightly cordate or obtuse at the oblique base (4″-8″ long); peduncles equalling the short petioles; *glands of the involucre minute, not appendaged;* pod obtusely angled; seeds ovate (1″ long, the largest of this section). — Sandy shore of the Atlantic and of the Great Lakes.

2. **E. Géyeri,** Engelm. Procumbent; *leaves oblong-ovate,* obtuse at the apex and the oblique base; peduncles equalling the petioles; *appendages of the involucre petal-like (white), orbicular;* pod acutely angled; seeds obtusely triangular (½″ long). — Sandy soil, Beardstown, Illinois (*Geyer*), and southwestward. — This is a small-seeded form (var. microspérma): other forms in Missouri and Texas have larger petal-like appendages and larger seeds.

3. **E. herniarioìdes,** Nutt. Prostrate; *leaves round-ovate,* obtuse at the base (only ½″-2½″ long); *peduncles much longer than the petioles,* lateral, single or clustered; *appendages of the involucre minute* and crenulate, or none; pod acutely angled; seeds obtusely angled (⅔″ long). — Banks of the Mississippi and lower Ohio, in rich alluvial soil, and southwestward.

* * *Seeds minutely roughened, ash-colored: leaves serrulate, hairy.*

4. **E. humistràta,** Engelm. mss. Procumbent, puberulent or hairy; leaves elliptical with an oblique obtuse base, serrulate towards the apex, sparsely hairy underneath (½′-¾′ long, sometimes with a brown spot above); peduncles rather shorter than the petioles, crowded in lateral clusters; involucre cleft on the back, its appendages orbicular or truncate and nearly entire; pod acutely angled, puberulent; seeds ovate, 4-angled (⅔″ long). — With the last. — Branches 6′-20′ long. Distinguished from the next by its broader leaves, slit involucre, and rounder, granulated (not transversely grooved) seed.

* * * *Seeds transversely wrinkled-pitted: leaves serrate, often hairy and falcate.*

5. **E. maculàta,** L. (SPOTTED SPURGE.) *Prostrate;* leaves very oblique at the base, oblong-linear (4″-6″ long), serrulate towards the apex.

mostly with a brown-purple spot in the centre; *peduncles equalling the petioles, crowded in lateral clusters;* glands of the involucre minute, with a petal-like somewhat crenate margin; *pod acutely angled,* puberulent; *seeds* ovate, *ash-colored* (⅓″ long), sharply 4-angled, and with about 4 grooves across each of the concave sides. (E. thymifolia, *Pursh.* E. depressa, *Torr.*) — Gravelly open places, everywhere.

6. **E. hypericifòlia,** L. (LARGER SPOTTED SPURGE.) *Ascending or erect* (1° – 2° high); leaves oblique at the obtuse or slightly cordate base, ovate-oblong or oblong-linear, serrate (½′ – 1½′ long), often with a red spot or red margins; *peduncles longer than the petioles, collected in loose leafy cymes* at the summit of the branches; appendages of the involucre small, round, and entire; *pod glabrous, obtusely angled; seeds* obtusely angled, wrinkled and tubercled (½″ long or nearly), *blackish.* — Rich soil in open places; very common.

§ 2. *Leaves destitute of stipules, all opposite: involucres solitary and peduncled, in the forks of the stem: root perennial.* (Oppositifòliæ.)

7. **E. Ipecacuánhæ,** L. (WILD IPECAC.) Stems many from a very long perpendicular root, erect or diffusely spreading (5′ – 10′ long), forking from near the base; leaves varying from obovate or oblong to narrowly linear, entire, almost sessile, glabrous; peduncles elongated (½′ – 1′ long); glands of the involucre 5, equal, not appendaged; pod long-pedicelled, obtusely angled, nearly smooth; seeds ovate, flattened, white, marked with impressed dots. — Sandy soil, near the coast, New York to Virginia, and southward. May – July.

§ 3. *Leaves destitute of stipules, alternate or opposite: involucres all crowded in a terminal cluster, bearing a few cup-shaped glands: root annual.* (Cyathóphoræ.)

8. **E. dentàta,** Michx. Erect or ascending, *hairy* (1° high); *leaves* alternate or opposite, ovate, lanceolate or linear, petioled, *coarsely toothed* (1′ – 2′ long); involucres almost sessile, with 5 ovate laciniate lobes and a *stalked gland,* and sometimes with 2 or 3; seeds globular, tubercled. — Rich soil, Ohio to Illinois and southward. July, Aug.

9. **E. cyathóphora,** Jacq. Ascending or erect (1° – 3° high), *glabrous; leaves* alternate, petioled, *ovate-fiddle-shaped and sinuate-toothed, or lanceolate, or linear and entire;* involucres about the length of the peduncle, with 5 ovate incised lobes and a single *sessile gland;* seeds globular, tubercled. — W. Illinois and southward. July. — Upper leaves mostly with red margins or base.

§ 4. *Leaves destitute of stipules, alternate or scattered up to where the flowering begins, the floral ones opposite or whorled, all commonly sessile: stem erect: flowering branches umbellately forked: involucres in the forks and terminal.* (Umbellàtæ.)

* *Glands of the involucre* 5, *entire, with* (*white*) *petal-like appendages: perennial.*

10. **E. corollàta,** L. (FLOWERING SPURGE.) Glabrous or sometimes sparingly hairy (2° – 3° high); leaves ovate, lanceolate, or linear, entire, obtuse; umbel 5- (3 – 7-) forked, and the forks again 2 – 3- (rarely 5-) forked; involucres long-peduncled; pods slender-pedicelled, smooth; seeds globular, slightly tubercled. — Rich or sandy soil, W. New York and New Jersey to Wisconsin and southward. June – Aug. — Conspicuous for the showy false lobes of the involucre, which appear like 5 white petals, the true lobes minute and incurved.

* * *Glands of the involucre entire, not appendaged: involucres nearly sessile.*

+ *Seeds rugose or reticulated: leaves serrulate: annuals.*

11. **E.** Helioscòpia, L. (Sun Spurge.) *Leaves all obovate* and very rounded (or retuse) at the end, *finely serrate,* those of the stem wedge-shaped; umbel divided into 5 rays, then into 3, or at length simply forked; *glands orbicular, stalked; pod smooth and even.* — Waste places, east of the Alleghanies: rather scarce. July–Sept. — Rather stout, branched from the root, 6′–12′ high, smooth or a little hairy. (Nat. from Eu.)

12. **E. Arkansàna,** Engelm. & Gr. Slender, very smooth throughout; *stem-leaves oblong- or obovate-spatulate, those of the flowering branches roundish-ovate* or slightly heart-shaped, very obtuse; umbels once or twice 3-forked, then 2-forked; *glands oval,* almost sessile; *pod warty;* seeds reticulated. — Lexington, Kentucky (*Short*), and southwestward.

+ + *Seeds smooth and even: pod warty or rough.*

13. **E. obtusàta,** Pursh. (Warted Spurge.) *Leaves all obtuse, minutely serrulate, smooth;* those of the stem oblong-spatulate, the uppermost and bracts dilated-ovate and barely mucronate; umbel once or twice divided into 3–5 rays, then into 2; glands oval; styles 2-cleft to the middle, scarcely longer than the ovary, which is warty with cylindrical projections. (E. platyphylla, *Amer. auth. & ed.* 1.) ① ② ? — Shady fertile woods, &c., Vermont to Virginia, and common westward. July–Sept. — The representative of the European E. platyphylla, which has the upper leaves acute, the upper bracts cuspidate, the styles 2-lobed at the apex only, and much longer than the ovary, which is warty with hemispherical glands. [The difference in the styles appears to be not altogether constant.]

14. **E. Darlingtònii,** Gray. Tall (2°–4° high); *leaves entire, minutely downy beneath;* those of the stem lanceolate-oblong, the lower floral ones oval, very obtuse, the upper roundish-dilated with a truncate base; umbel 5–8-rayed, afterwards simply forked; glands obliquely oval, sessile; pod obscurely warty. ♃ (E. nemoràlis, *Darl.*, not of *Kit.*) — Copses, &c., Penn. and southward along the mountains.

* * * *Glands of the involucre crescent-shaped or 2-horned, naked.* (*Stems erect: leaves entire: plant glabrous.*)

+ *Seeds smooth, blackish or dull: perennials, with running rootstocks.*

15. **E.** Ésula, L. Stems clustered (1° high); *leaves lanceolate or linear; the floral* (yellowish) *broadly heart-shaped,* mucronate; umbel divided into many rays, then forking; also with scattered flowering branches below; *glands short-horned* (brown); pods smoothish. — Essex County, Massachusetts, *Oakes:* likely to become a troublesome weed. June. (Adv. from Eu.)

16. **E.** Cyparíssias, L. (Cypress Spurge.) Stems densely clustered (½′–1′ high); *stem-leaves linear,* crowded, *the floral ones heart-shaped;* umbel many-rayed, and with some scattered flowering branches below; *glands crescent-shaped;* pods granular. — Escaped from gardens to road-sides, in a few places in New England. (Adv. from Eu.)

+ + *Seeds sculptured, ash-colored: root biennial or annual.*

++ *Leaves scattered, thin and membranaceous: pod smooth.*

17. **E. Péplus**, L. (Petty Spurge.) Erect or ascending (5′–10′ high); *leaves petioled*, round-obovate; the upper floral ones ovate; umbel 3-rayed, then forking; glands long-horned; lobes of the *pod 2-wing-crested* on the back; *seeds 2-grooved on the inner face, pitted on the back.* ① — Waste places in the Eastern States; rather rare. (Nat. from Eu.)

18. **E. commutàta,** Engelm. mss. Stems branched from a commonly decumbent base (6′–12′ high); *leaves* obovate, the upper all *sessile*, the upper floral roundish-dilated, broader than long; *pod obtusely angled, crestless; seeds ovate, pitted all over.* ② ① ♃ ? — Along water-courses, from Virginia toward the mountains to Ohio and westward. — Leaves often persistent over the winter on sterile shoots, turning red, like those of the European E. amygdaloides Seeds 1″ long, larger than those of E. Peplus; with which this has been confounded; but the character of the pods and seeds readily distinguish it.

++ ++ *Leaves all opposite or nearly so, thickish: pod smooth.*

19. **E. Láthyris**, L. (Caper Spurge.) Stem stout (2°–3° high); leaves linear-oblong, the floral oblong-ovate and heart-shaped, pointed; umbel 3–4-rayed, then forking; glands short-horned. ② — Sparingly escaped from gardens, where it is common. (Adv. from Eu.)

2. CNIDOSCÒLUS, Pohl. Spurge-Nettle.

Flowers monœcious, in a terminal open forking cyme; the fertile ones usually in the lower forks. Calyx corolla-like (white); in the staminate flowers salver-shaped, 5-lobed; in the pistillate, 5-parted, convolute in the bud. Corolla none. Hypogynous glands 5, small. *Ster. Fl.* Stamens 10, monadelphous below, the inner ones longer. *Fert. Fl.* Ovary 3-celled: styles 3, short, somewhat united, many-cleft. Pod 3-celled, bristly-hairy, 3-seeded, separating into 3 two-valved carpels. — Perennials, beset with stinging bristles (whence apparently the name, from κνίδη, *a nettle*, and σκῶλος, *a prickle*).

1. **C. stimulòsa.** (Tread-Softly.) Herbaceous, from a long perennial root, branching (6′–18′ high); leaves roundish-heart-shaped, 3–5-lobed (Játropha stimulosa, *Michx.*) — Sandy soil, Virginia and southward.

3. ACALỲPHA, L. Three-seeded Mercury.

Flowers monœcious; the sterile very small, clustered in spikes, with the few or solitary fertile flowers at their base, or sometimes in separate spikes. Calyx of the sterile flowers 4-parted; of the fertile, 3-parted. Corolla none. Stamens 8–16: filaments short, monadelphous at the base: anther-cells separate, long, hanging from the apex of the filament. Styles 3, cut-fringed (red). Pod separating into 3 globular carpels which split into 2 valves, rarely of only one carpel. — Annual herbs (in N. America), with the appearance of Nettles or Amaranths; the leaves alternate, petioled, with stipules. Clusters of sterile flowers with a minute bract; the fertile surrounded by a large and leaf-like cut-lobed persistent bract. (Ἀκαλήφη, an ancient name of the Nettle.)

* *Fruit smooth or merely pubescent.*

1. **A. Virgínica,** L. *Leaves ovate or oblong-ovate, obtusely and sparsely serrate, long-petioled; sterile spike* rather few-flowered, mostly *shorter than the deeply palmately-cleft fruiting bracts.* — Fields and open places; common. July – Sept. — A homely weed, 1° – 2° high, smoothish or rather hairy, often turning purplish in autumn. Fertile flowers 1 – 3 in each axil, along with the small and short-peduncled sterile spike: bracts very large and leaf-like, unequally cut into 5 – 9 lanceolate lobes.

2. **A. grácilens.** *Leaves lanceolate,* oblong-lanceolate, or linear, *obscurely serrate, short-petioled,* mostly obtuse; *sterile spike long and slender, much longer than the cut-toothed bract.* — Sandy dry soil, Rhode Island to Illinois, and common southward. — A somewhat downy plant, 6′ – 12′ high; the heart-ovate fruiting bract sharply cut-toothed, or barely cleft at the sides; the sterile spike frequently 1′ long and half the length of the leaves. — Perhaps runs into the last. — Var. MONOCÓCCA, Engelm., is a narrow and nearly entire-leaved form, with only one cell to the fruit, and the seed larger. Western Illinois.

* * *Fruit echinate with soft bristly green projections.*

3. **A. Caroliniàna,** Walt. *Leaves thin, ovate-cordate, sharply and closely serrate-toothed,* abruptly acuminate, long-petioled; sterile spikes short; the fertile ones mostly terminal and elongated, its bracts deeply cut into many linear lobes. (A. ostryæfolia, *Riddell.*) — New Jersey (Princeton, *Torrey*), Ohio, and southward.

4. TRÀGIA, Plumier. TRAGIA.

Flowers monœcious, in racemes, apetalous. *Ster. Fl.* Calyx 3-parted. Stamens 2 or 3: filaments short, distinct. *Fert. Fl.* Calyx 5 – 8- (mostly 6-) parted, persistent. Style 3-cleft: stigmas 3, simple. Pod 3-celled, 3-lobed, bristly, separating into three 2-valved 1-seeded carpels. — Erect or climbing plants (perennial herbs in U. S.), pubescent or hispid, with mostly alternate leaves; the small-flowered racemes terminal or opposite the leaves (rarely axillary); the sterile flowers above, the few fertile at the base, all with small bracts. (Named for the early herbalist *Tragus.*)

1. **T. ùrens,** L. *Erect,* paniculate-branched, *softly hairy-pubescent* (1° high); *leaves* varying from obovate-oblong to lance-linear, *acute at the base,* obtusely or sinuately few-toothed or lobed, sometimes entire, *short-petioled or sessile.* — Dry ground, Virginia and southward. May – Aug. (A bad name for the species; for the hairs are not at all stinging nor sharp. Walter's name, T. innócua, should supersede it.)

2. **T. urticifòlia,** Michx. *Erect or reclining, hirsute; leaves ovate-lanceolate or triangular-lanceolate,* or the lower ovate, *all somewhat cordate or truncate at the base,* coarsely cut-toothed, *short-petioled.* — Virginia (*Pursh*), and common southward.

3. **T. macrocárpa,** Willd. *Twining,* somewhat hirsute; *leaves deeply cordate,* ovate, sharply serrate (3′ long), all but the uppermost *long-petioled* (pod ½′ broad). (T. cordàta, *Michx.*) — Kentucky (*Michaux*), and southward.

5. STILLÍNGIA, Garden. STILLINGIA.

Flowers monœcious, aggregated in a terminal spike, apetalous. *Ster. Fl.* Calyx a 2-cleft or crenulate little cup. Stamens 2: filaments elongated, united at the base: anthers adnate, turned outwards. *Fert. Fl.* Calyx 3-toothed or cleft. Style thick: stigmas 3, diverging, simple. Pod 3-celled, 3-lobed, 3-seeded. — Smooth upright plants, with the alternate leaves mostly 2-glandular at the base; the fertile flowers few at the base of the dense sterile spike (rarely separate); the bract for each cluster with a gland on each side. (Named for *Dr. B. Stillingfleet.*)

1. **S. sylvática,** L. Herbaceous (2° - 3° high); leaves almost sessile, oblong-lanceolate, serrulate; glands of the spike saucer-shaped. — Sandy and dry soil, Virginia and southward. June.

6. CRÒTON, L. CROTON.

Flowers monœcious, spiked or glomerate. *Ster. Fl.* Calyx 5-parted, rarely 4-parted, valvate in the bud. Petals as many as the divisions of the calyx, mostly small, hypogynous. Stamens 5 - 20, distinct: anthers turned inwards. Glands or lobes of the central disk as many as the calyx-lobes and opposite them. *Fert. Fl.* Calyx 5- (rarely 8-) cleft or parted. Petals often none or minute. Glands or disk as in the sterile, or none. Ovary 3-celled, rarely 2-celled, with as many styles, which are from once to thrice 2-cleft. Pod 3- (rarely 2-) celled and lobed, separating into as many 2-valved 1-seeded carpels. — Stellate-downy, or scurfy, or hairy and glandular plants, mostly strong-scented; the sterile flowers above; the fertile below, usually at the base of the same spike or cluster. Leaves alternate, or sometimes imperfectly opposite. (Κροτών, the Greek name of the Castor-oil Plant, of this family.) — The following have been made into as many genera by Klotzsch, apparently without sufficient reason.

§ 1. PILINÓPHYTUM, Klotzsch. — *Sterile flowers with the calyx 5-parted, 5 glands alternate with the petals, and* 10 - 12 *stamens on the hairy receptacle: fertile flowers with an unequally* 8*-cleft calyx and no petals; the* 3 *styles twice or thrice* 2*-cleft.*

1. **C. capitàtum,** Michx. Soft-woolly and somewhat glandular (1° 2° high), branched; leaves very long-petioled, lance-oblong or elongated-oblong, rounded at the base, entire; fertile flowers several, capitate-crowded at the base of the short terminal sterile spike. ① — Barrens of Illinois, Kentucky, and southward. Pine barrens of New Jersey, *Knieskern!* July - Sept.

§ 2. GEISELÈRIA, Klotzsch. — *Sterile flowers with a* 4*-parted calyx,* 4 *ovate-lanceolate petals, a* 4*-rayed disk, and* 8 *stamens: fertile flowers with a* 5*-parted calyx, and very minute awl-shaped rudiments of petals; the* 3 *styles* 2*-cleft.*

2. **C. glandulòsum,** L. Rough-hairy and glandular (1° - 2° high), somewhat umbellately branched; leaves oblong or linear-oblong, obtusely toothed, the base with a saucer-shaped gland on each side; fertile flowers capitate-clustered at the base of the sterile spike, sessile in the forks and terminal. ① — Open waste places, Virginia, Illinois, and southward. July - Sept

§ 3. GYNAMBLÒSIS, Torr. (Engelmannia, *Klotzsch.*) — *Sterile flowers with a 5- (sometimes 3 – 4-) parted calyx, and as many petals and scale-like glands opposite the latter, the stamens varying from* 5 *to* 10 : *fertile flowers with a 5-parted calyx, no petals,* 5 *glands, and a 2-celled ovary, crowned with* 2 *sessile 2-parted stigmas; the fruit 2-seeded, or often by abortion 1-seeded.* (This may perhaps rank as a genus.)

3. **C. monanthógynum,** Michx. Repeatedly 3 – 2-forked into diverging branches, stellately pubescent; leaves silvery-woolly beneath, ovate-elliptical or oblong, often a little heart-shaped at the base, entire, on slender petioles; flowers in the forks, the sterile few on the summit of a short erect peduncle, the fertile few and clustered or mostly solitary on short recurved peduncles. ① (C. ellípticum, *Nutt.* Engelmannia Nuttalliana, *Klotzsch.* Gynamblosis monanthogyna, *Torr.*) — Barrens and dry prairies, from Illinois and Kentucky southward and westward. June – Sept.

7. CROTONÓPSIS, Michx. Crotonopsis.

Flowers monœcious, axillary along the branches, and terminal, the lower fertile. *Ster. Fl.* Calyx 5-parted. Petals and stamens 5 : filaments distinct, enlarged at the apex. *Fert. Fl.* Calyx 3 – 5-parted. Petals none. Petal-like scales 5, opposite the sepals. Ovary 1-celled, 1-ovuled : stigmas 3, each 2-lobed. Fruit dry and indehiscent, small, 1-seeded. — A slender low annual, with alternate or opposite short-petioled linear or lanceolate leaves, which are green and smoothish above, but silvery hoary with starry hairs and scurfy with brownish scales underneath, as well as the branches, &c. (Name compounded of Κρότων, and ὄψις, *appearance,* for a plant with the aspect of Croton.)

1. **C. lineàris,** Michx. — Pine barrens of New Jersey (*Knieskern*) to Virginia, Kentucky, and southward. July – Sept. — Flowers sessile, small.

8. PHYLLÁNTHUS, L. Phyllanthus.

Flowers monœcious, axillary. Calyx 5 – 6-parted. Petals none. *Ster. Fl.* Stamens 3 : filaments united in a column, surrounded by 5 – 6 glands or a 5 – 6-lobed glandular disk. *Fert. Fl.* Ovary 3-celled; the cells 2-ovuled : styles 3, each 2-cleft : stigmas 6. Pod depressed, separating into 3 carpels, which split into 2 valves. — Leaves alternate, with small stipules. (Name composed of φύλλον, *leaf,* and ἄνθος, *blossom,* because the flowers in some species [not in ours] are borne upon what appear like leaves.)

1. **P. Carolinénsis,** Walt. Annual, low and slender, branched; leaves 2-ranked, obovate or oval, short-petioled; flowers commonly 2 in each axil, almost sessile, one staminate, the other fertile. — Gravelly banks; W. Penn. to Illinois and southward. July – Sept.

9. PACHYSÁNDRA, Michx. Pachysandra.

Flowers monœcious, in naked spikes. Calyx 4-parted. Petals none. *Ster. Fl.* Stamens 4, separate, surrounding the rudiment of an ovary : filaments long-exserted, thick and flat : anthers oblong-linear. *Fert. Fl.* Ovary 3-celled :

styles 3, thick, awl-shaped, recurved, stigmatic down their whole length inside Pod globular, 3-horned, 3-celled, splitting into 3 at length 2-valved 2-seeded carpels. — Nearly glabrous, low and procumbent, perennial herbs, with matted creeping rootstocks, and alternate, ovate or obovate, coarsely toothed leaves, narrowed at the base into a petiole. Flowers each 1 – 3-bracted, the upper ones staminate, a few fertile ones at the base, unpleasantly scented: sepals greenish: filaments white (the size and thickness of the latter giving the name, from παχὺς, *thick*, and ἄνδρα, used for stamen).

1. **P. procúmbens,** Michx. Stems (6′ – 9′ long) bearing several approximate leaves at the summit on slender petioles, and a few many-flowered spikes along the base; the intervening portion naked, or with a few small scales. — Woods; mountains of Kentucky, W. Virginia, and southward. March, April.

Rícinus commúnis, the Castor-oil Plant, and Búxus sempérvirens, the Box, are cultivated representatives of this order.

Mercuriàlis ánnua, of Europe, has been found growing spontaneously in Boston, and in Charleston, S. Carolina.

Order 103. EMPETRACEÆ. (Crowberry Family.)

Low shrubby evergreens, with the foliage, aspect, and compound pollen of Heaths, *and the drupaceous fruit of* Arctostaphylos, but the stigmas, &c. of Euphorbiaceæ: — probably an apetalous and polygamous or diœcious degenerate form of Ericaceæ, — comprising three genera, two of which occur within the limits of this work, and the third in Georgia, &c.

1. ÉMPETRUM, Tourn. Crowberry.

Flowers polygamous, scattered and solitary in the axils of the leaves (inconspicuous), scaly-bracted. Calyx of 3 spreading and somewhat petal-like sepals. Stamens 3. Style very short: stigma 6 – 9-rayed. Fruit a berry-like drupe, with 6 – 9 seed-like nutlets; each containing an erect anatropous seed. Embryo terete, in the axis of copious albumen, with a slender inferior radicle and very small cotyledons. (An ancient name, from ἐν, *upon*, and πέτρος, *a rock*.)

1. **E. nigrum,** L. (Black Crowberry.) Procumbent and trailing; leaves linear-oblong, scattered; fruit black. — Alpine summits of the mountains of New England and N. New York; L. Superior, and northward. (Eu.)

2. CORÈMA, Don. (Broom-Crowberry.)

Flowers diœcious or polygamous, collected in terminal heads, each in the axil of a scaly bract, and with 5 or 6 thin and scarious imbricated bractlets, but no proper calyx. Stamens 3, rarely 4, with long filaments. Style slender, 3- (4 – 5-) cleft: stigmas narrow, often toothed. Drupe small, with 3 (rarely 4 – 5) nutlets. Seed, &c. as in the last. — Diffusely much-branched little shrubs, with scattered or nearly whorled narrowly linear leaves. (Name κόρημα, *a broom*, from the bushy aspect.)

1. **C. Conrádii,** Torrey. Diffusely branched, nearly smooth; drupe very small, dry and juiceless when ripe. (Empetrum, *Torr.* Tuckermánia, *Klotzsch.* Oakèsia, *Tuck.*) — Sandy pine barrens and dry rocky places, New Jersey, Long Island; Plymouth, Massachusetts; Bath, and islands of Penobscot Bay, Maine. (Also Newfoundland.) April. — Shrub 6′–9′ high: the sterile plant handsome in flower, on account of the tufted purple filaments and brown-purple anthers. (*Gray, Chlor. Bor.-Am. t.* 1.)

ORDER 104. URTICÀCEÆ. (NETTLE FAMILY.)

Plants with stipules, and monœcious, diœcious, or sometimes (in the Elm Family) *perfect flowers, furnished with a regular calyx, free from the* 1-*celled (rarely* 2-*celled) ovary which forms a* 1-*seeded fruit; the embryo in the albumen when this is present; the radicle pointing upwards; the stamens as many as the lobes of the calyx and opposite them, or sometimes fewer.* Cotyledons usually broad. Stipules often deciduous. — A large order (far the greater part tropical), comprising four well-marked suborders, viz.: —

SUBORDER I. ULMACEÆ. THE ELM FAMILY.

Flowers perfect or monœciously polygamous. Filaments straight or moderately incurved in the bud. Styles or stigmas 2. Fruit a samara or drupe. Seed suspended. — Trees, with a watery juice (no active or noxious properties), and alternate leaves.

* Fruit dry winged or crested (a samara): anthers extrorse.

1. ULMUS. Flowers mostly perfect. Ovary 2-celled, 2-ovuled. Fruit 1-celled, winged all round. Embryo straight.
2. PLANERA. Flowers polygamous. Ovary 1-celled. Fruit wingless, many-crested.

* * Fruit a drupe: anthers introrse.

3. CELTIS. Flowers polygamous. Ovary 1-celled. Cotyledons curved and crumpled.

SUBORDER II. ARTOCARPEÆ. THE BREAD-FRUIT & FIG FAM.

Flowers monœcious or diœcious, crowded in catkin-like spikes or heads; the calyx, &c. becoming fleshy or juicy in fruit, but the 1- (rarely 2-) celled ovary ripening as a dry achenium. Styles or stigmas commonly 2. — Mostly trees or shrubs, with a milky or yellow (acrid or poisonous) juice, and alternate (rough or smooth) leaves. — Stamens inflexed in the bud, and elastically spreading when the flower opens, in the Tribe MOREÆ.

4. MORUS. Fertile and sterile flowers in separate spikes. Stamens 4. Calyx berry-like in fruit.

SUBORDER III. URTICEÆ. THE NETTLE FAMILY.

Flowers monœcious or diœcious. Filaments transversely wrinkled and inflexed in the bud, straightening or spreading elastically when the flower opens. Style or stigma simple. Ovary always 1-celled, with an erect orthotropous ovule, forming an achenium in fruit. Embryo straight in the axis of albumen. — Herbs (or in the tropics often shrubs or trees), with a watery (innocuous) juice, a tough fibrous bark, and opposite or alternate leaves: many are armed with stinging hairs.

* Calyx of the fertile flowers of 2 - 4 separate or nearly separate sepals.

← Plant beset with stinging bristles.

5. **URTICA.** Sepals 4 in both sterile and fertile flowers. Achenium straight and erect, enclosed by the 2 inner and larger sepals. Stigma capitate-tufted. Leaves opposite.
6. **LAPORTEA.** Sepals 5 in the sterile flowers, 4 in the fertile, or apparently only 2, the two exterior minute and obscure. Achenium very oblique and bent down, nearly naked Stigma long and awl-shaped Leaves alternate.

← ← Plant wholly destitute of stinging hairs.

7. **PILEA.** Sepals 3 or 4, those of the fertile flowers all or all but one small. Achenium partly naked, straight and erect. Stigma pencil-tufted. Leaves opposite.

* * Calyx of the fertile flowers tubular or cup-shaped, enclosing the achenium.

8. **BŒHMERIA.** Flowers monœcious, glomerate, the clusters spiked, not involucrate. Style long and thread-shaped, stigmatic down one side.
9. **PARIETARIA.** Flowers polygamous, in involucrate-bracted clusters. Stigma tufted

SUBORDER IV. CANNABINEÆ. THE HEMP FAMILY.

Flowers diœcious; the sterile racemed or panicled; the fertile in clusters or catkins. Filaments short, not inflexed in the bud. Fertile calyx of one sepal, embracing the ovary. Stigmas 2, elongated. Ovary 1-celled, with an erect orthotropous ovule, forming a glandular achenium in fruit. Seed with no albumen. Embryo coiled or bent. — Herbs with a watery juice and mostly opposite lobed or divided leaves, a fibrous inner bark, &c. (yielding bitter and narcotic products).

10. **CANNABIS.** Fertile flowers spiked-clustered. Anthers drooping. Leaves 5 - 7-divided.
11. **HUMULUS.** Fertile flowers in a short spike forming a membranaceous catkin in fruit Anthers erect. Leaves 3 - 5-lobed.

SUBORDER I. ULMÀCEÆ. THE ELM FAMILY

1. ÚLMUS, L. ELM.

Calyx bell-shaped, 4 – 9-cleft. Stamens 4 – 9, with long and slender filaments. Ovary flat, 2-celled, with a single anatropous ovule suspended from the summit of each cell: styles 2, short, diverging, stigmatic all along the inner edge. Fruit (by obliteration) a 1-celled and 1-seeded membranaceous samara, winged all around. Albumen none: embryo straight; the cotyledons large. — Flowers perfect or polygamous, purplish or yellowish, in lateral clusters, in our species preceding the leaves, which are strongly straight-veined, short-petioled, and oblique or unequally somewhat heart-shaped at the base. Stipules small, caducous. (The classical Latin name.)

* *Flowers appearing nearly sessile: fruit orbicular, not ciliate: leaves very rough above.*

1. **U. fúlva,** Mich. (SLIPPERY or RED ELM.) Buds before expansion soft-downy with rusty hairs (large); leaves ovate-oblong, taper-pointed, doubly serrate (4′ – 8′ long, sweet-scented in drying), soft-downy underneath or slightly

rough downwards; branchlets downy; calyx-lobes and stamens 7 – 9; fruit (⅝′ – ¾′ wide) with the cell pubescent. — Along streams, common from W. New England to Wisconsin and Kentucky. March, April. — A small or middle-sized tree, with tough reddish wood, and a very mucilaginous inner bark.

* * *Flowers on slender drooping peduncles or pedicels, which are jointed above the middle: fruit ovate or oval, fringed-ciliate: leaves smooth and glabrous above, or nearly so.*

2. **U. Americàna,** L. (pl. Clayt.), Willd. (AMERICAN or WHITE ELM.) *Buds and branchlets* glabrous; *branches not corky;* leaves obovate-oblong or oval, abruptly pointed, sharply and often doubly serrate (2′ – 4′ long), soft-pubescent beneath, or soon glabrous; *flowers in close fascicles;* calyx with 7 – 9 roundish lobes; *fruit glabrous* except the margins (½′ long), its sharp points incurved and closing the notch. — Moist woods, especially along rivers, in rich soil; common. April. — A large and well-known ornamental tree, with spreading branches and drooping branchlets.

3. **U. racemòsa,** Thomas. (CORKY WHITE ELM.) *Bud-scales downy-ciliate,* and somewhat pubescent, as are the young branchlets; *branches often with corky ridges;* leaves nearly as in the last; *flowers racemed;* fruit much as in the last, but rather larger. — River-banks, W. New England, New York, and Michigan. April. — Wood tougher and finer-grained than in the last.

4. **U. alàta,** Michx. (WINGED ELM. WHAHOO.) *Bud-scales and branchlets nearly glabrous; branches corky-winged,* at least some of them; leaves ovate-oblong and oblong-lanceolate, acute, thickish, small (1′ – 2½′ long), seldom oblique; calyx-lobes obovate; fruit downy on the face, at least when young. — Virginia, Kentucky, and southward. March. — Wood fine-grained, valuable.

U. CAMPÉSTRIS, L., the ENGLISH ELM, was early introduced near Boston, &c.

2. PLÁNERA, Gmel. PLANER-TREE.

Flowers monœciously polygamous. Calyx 4 – 5-cleft. Stamens 4 – 5. Ovary ovoid, 1-celled, 1-ovuled, crowned with 2 spreading styles which are stigmatose down the inner side, in fruit becoming coriaceous and nut-like, not winged. Albumen none: embryo straight. — Trees with small leaves, like those of Elms, the flowers appearing with them, in small axillary clusters. (Named for *J. J. Planer,* a German botanist.)

1. **P. aquática,** Gmel. Nearly glabrous; leaves ovate-oblong, small; fruit stalked in the calyx, beset with irregular rough projections. — Wet banks, Kentucky (*Michx.*) and southward. April.

3. CÉLTIS, Tourn. NETTLE-TREE. HACKBERRY.

Flowers monœciously polygamous. Calyx 5 – 6-parted, persistent. Stamens 5 – 6. Ovary 1-celled, with a single suspended ovule: stigmas 2, long and pointed, recurved. Fruit a globular drupe. Embryo curved, nearly enclosing a little gelatinous albumen: cotyledons folded and crumpled. — Leaves pointed, petioled. Stipules caducous. Flowers greenish, axillary, the fertile solitary or in pairs, peduncled, appearing with the leaves; the lower usually staminate only, in little fascicles or racemose along the base of the branches of the season. (An ancient Greek name for the Lotus; the fruit of the European Nettle-tree is supposed to have been the food of the *Lotophagi*.)

1. **C. occidentàlis,** L. (SUGARBERRY. HACKBERRY.) *Leaves reticulated*, ovate, cordate-ovate and ovate-lanceolate, taper-pointed, usually conspicuously and sharply so, more or less oblique at the base, glabrous, *sharply serrate*, sometimes sparingly so, or soft-pubescent beneath, at least when young; fruit on a peduncle from once to twice the length of the petiole, reddish or yellowish, turning dark purple at maturity, its peduncle once or twice the length of the petiole. (Also C. Audibertiana, *Spach.*, &c.) — Woods and river-banks, S. New England to Wisconsin and southward. April, May. — A small or middle-sized tree, with the aspect of an Elm, with sweet and edible fruits as large as bird-cherries, at first obovate, ripe in autumn; the flesh thin. — Var. PÙMILA. Low and straggling (4°-10° high); leaves thin when mature, and smooth, slightly acuminate. (C. pumila, *Pursh.*) River-banks, on rocks, from Maryland southward. — Var. CRASSIFÒLIA. A tall or low tree; leaves thicker, usually serrate all round, and with a long tapering point, dull above, pale beneath. (C. crassifolia, *Lam.*) — Common southward and westward. — All plainly of one species.

2. **C. Mississippiénsis,** Bosc. *Leaves entire, very long taper-pointed*, rounded at the base, mostly oblique, thin, and smooth; fruit small. (C. integrifolia, *Nutt.*) — W. Kentucky (and Illinois?) and southwestward. — Even this probably runs into the last.

SUBORDER II. ARTOCÁRPEÆ. BREAD-FRUIT & FIG FAMILY

4. MÒRUS, Tourn. MULBERRY.

Flowers monœcious or diœcious; the two kinds in separate axillary catkin-like spikes. Calyx 4-parted, the sepals ovate. Stamens 4: filaments elastically expanding. Ovary 2-celled, one of the cells smaller and disappearing: styles 2, thread-form, stigmatic down the inside. Achenium ovate, compressed, covered by the succulent berry-like calyx, the whole fertile spike thus becoming a thickened oblong and juicy (edible) aggregate fruit. — Trees with milky juice and rounded leaves: sterile spikes rather slender. (Μορέα, the ancient name.)

1. **M. rùbra,** L. (RED MULBERRY.) *Leaves* heart-ovate, serrate, *rough above, downy underneath*, pointed (on young shoots often variously lobed); flowers frequently diœcious; *fruit dark purple.* — Rich woods, New England to Illinois and southward. May. — A small tree, ripening its sweetish blackberry-like fruit in July.

2. **M.** ÁLBA, L. (WHITE MULBERRY.) *Leaves* obliquely heart-ovate, acute, serrate, sometimes lobed, *smooth and shining; fruit whitish.* — Spontaneous near houses: introduced for feeding silk-worms. (Adv. from Eu.)

M. NÌGRA, L., the BLACK MULBERRY of Europe, is also occasionally cultivated.

BROUSSONÉTIA PAPYRÍFERA, Vent., the PAPER MULBERRY of Japan, is often cultivated as a shade tree.

MACLÙRA AURANTÌACA, Nutt., the OSAGE ORANGE, or BOW-WOOD of Arkansas, is sparingly cultivated for hedges.

SUBORDER III. URTÍCEÆ. THE TRUE NETTLE FAMILY

5. URTÌCA, Tourn. NETTLE.

Flowers monœcious, or rarely diœcious, in panicled racemes or spikes, or close clusters. *Ster. Fl.* Sepals 4. Stamens 4, inserted around the cup-shaped rudiment of a pistil. *Fert. Fl.* Sepals 4, in pairs; the 2 outer much smaller, somewhat keeled, spreading; the 2 inner flat or concave, in fruit membranaceous and enclosing the straight and erect ovate flattened achenium. Stigma sessile, capitate and pencil-tufted. — Herbs armed with stinging hairs. Leaves opposite. Flowers greenish. (The classical Latin name; from *uro*, to burn.)

* *Flowers in branching panicled spikes, often diœcious.*

1. **U. grácilis,** Ait. (TALL WILD NETTLE.) *Sparingly bristly,* slender (2° - 6° high); *leaves ovate-lanceolate,* pointed, serrate, 3 - 5-nerved from the rounded or scarcely heart-shaped base, *almost glabrous, the elongated petioles sparingly bristly;* spikes slender and loosely panicled. ♃ (U. prócera, *Willd.*) — Fence-rows and moist ground; common, especially northward. July. — Totally distinct from the next, with slenderer and longer-petioled leaves, smaller flowers, and scarcely any stinging hairs except on the petioles and sparingly on the principal veins.

2. **U.** DIOÌCA, L. (GREAT STINGING-NETTLE.) *Very bristly and stinging* (2° - 3° high); *leaves ovate, heart-shaped,* pointed, *very deeply serrate, downy underneath* as well as the upper part of the stem; *spikes much branched.* ♃ — Waste places, and road-sides, chiefly eastward. June - Aug. (Nat. from Eu.)

* * *Flowers in simple capitate clusters, on peduncles shorter than the slender petioles.*

3. **U.** ÙRENS, L. (SMALL STINGING-NETTLE.) *Leaves elliptical or ovate,* very coarsely and deeply serrate with spreading teeth; *flower-clusters 2 in each axil, small and loose.* ① — Waste grounds, near dwellings, eastward: scarce. Plant 8′ - 12′ high, sparsely beset with stinging bristles. (Nat. from Eu.)

4. **U. purpuráscens,** Nutt. *Leaves ovate and mostly heart-shaped,* the upper ovate-lanceolate, coarsely serrate-toothed; *flower-clusters globular,* 1 - 2 in each axil, and spiked at the summit. ① ? — Alluvial soil, in shade; Kentucky and southward. — Stem slender, ½° - 3° high, beset with scattered stinging bristles, as are the petioles, &c.

6. LAPÓRTEA, Gaudich. WOOD NETTLE.

Flowers monœcious or sometimes diœcious, in loose cymes; the upper widely spreading and chiefly or entirely fertile; the lower mostly sterile. *Ster. Fl.* Sepals and stamens 5, with a hemispherical rudiment of an ovary. *Fert. Fl.* Calyx of 4 sepals, the two outer or one of them minute; the two inner much

larger. Stigma elongated awl-shaped, hairy down one side. Achenium ovate, flat, extremely oblique, reflexed on the winged or margined pedicel, nearly naked. — Perennial herbs, with stinging hairs and large alternate serrate leaves. (Named for *M. Laporte.*)

1. **L. Canadénsis,** Gaudich. Leaves ovate, pointed, strongly feather-veined (3′–7′ long), long-petioled; fertile cymes divergent. (U. Canadensis and U. divaricata, *L.*) — Moist rich woods; common. — Stem 2°–5° high.

7. PÌLEA, Lindl. RICHWEED. CLEARWEED.

Flowers monœcious or diœcious, clustered in axillary cymes. *Ster. Fl.* Sepals and stamens 3–4. *Fert. Fl.* Sepals 3, oblong, more or less unequal: a rudiment of a stamen commonly before each in the form of a hooded scale. Stigma sessile, pencil-tufted. Achenium ovate, compressed, straight and erect, partly or nearly naked. — Stingless, mostly glabrous and low herbs, with opposite somewhat 3-nerved leaves and united stipules; the staminate flowers on jointed pedicels, often mixed with the fertile. (Named from the shape of the larger sepal of the fertile flower in the original species, like the *pileus,* or felt cap, of the Romans, which partly covers the achenium. In our species the three sepals are nearly equal, small, and not hooded.)

1. **P. pùmila.** (RICHWEED. CLEARWEED.) Low (3′–18′ high); stems smooth and shining, pellucid; leaves ovate, coarsely toothed, pointed; clusters much shorter than the petioles; sepals of the fertile flowers lanceolate, scarcely unequal. ① (Dubrueília, *Gaud.* Adìce, *Raf.*) — Cool and moist shaded places; common. July–Sept.

8. BŒHMÈRIA, Jacq. FALSE NETTLE.

Flowers monœcious or diœcious; the sterile much as in Urtica; the fertile with a tubular or urn-shaped entire or 2–4-toothed calyx enclosing the ovary. Style elongated awl-shaped, stigmatic and hairy down one side. Achenium elliptical, closely invested by the dry or somewhat fleshy persistent compressed calyx. — Hairs not stinging. (Named after *G. R. Böhmer,* Prof. at Wittemberg in the last century.)

1. **B. cylíndrica,** Willd. Smoothish; stem (1°–3° high) simple; leaves chiefly opposite, oblong-ovate or ovate-lanceolate, pointed, serrate, 3-nerved, long-petioled; flowers diœcious, or the two kinds intermixed, the small clusters densely aggregated in simple and elongated axillary spikes, the sterile interrupted, the fertile often continuous. ♃ — A state with alternate leaves is B. laterifIòra, *Muhl.* — Moist thickets, &c.; common. July–Sept.

9. PARIETÀRIA, Tourn. PELLITORY.

Flowers monœciously polygamous; the staminate, pistillate, and perfect intermixed in the same involucrate-bracted cymose axillary clusters; the sterile much as in the last; the fertile with a tubular or bell-shaped 4-lobed and nerved calyx, woolly inside, and enclosing the ovary and adherent to the ovoid achenium. Stigma pencil-tufted. — Small homely herbs, chiefly with alternate leaves; not stinging. (Name from *paries*, a wall; from the places where the European species often grow.)

1. **P. Pennsylvánica,** Muhl. (AMERICAN PELLITORY.) Low, annual, simple or sparingly branched, minutely downy; leaves oblong-lanceolate, very thin, veiny, roughish with opaque dots; flowers shorter than the leaves of the involucre; stigma sessile. — Shaded rocky banks, Vermont to Wisconsin and southward. June - Aug.

SUBORDER IV. CANNABÍNEÆ. THE HEMP FAMILY.

10. CÁNNABIS, Tourn. HEMP.

Flowers diœcious; the sterile in axillary compound racemes or panicles, with 5 sepals and 5 drooping stamens. Fertile flowers spiked-clustered, 1-bracted: the calyx of a single sepal swollen at the base and folded round the ovary. Embryo simply curved. — A tall roughish annual, with digitate leaves of 5 - 7 linear-lanceolate coarsely toothed leaflets, the upper alternate; the inner bark of very tough fibres. (The ancient name, of obscure etymology.)

1. **C.** SATÌVA, L. — Waste places, escaped from cultivation. (Adv. from Eu.)

11. HÙMULUS, L. HOP.

Flowers diœcious; the sterile in loose axillary panicles, with 5 sepals and 5 erect stamens. Fertile flowers in short axillary and solitary spikes or catkins: bracts foliaceous, imbricated, each 2-flowered, in fruit forming a sort of membranaceous strobile. Calyx of one sepal, embracing the ovary. Achenia invested with the enlarged scale-like calyx. Embryo coiled in a flat spiral. — A rough perennial twining herb, with mostly opposite heart-shaped and 3 - 5-lobed leaves, and persistent ovate stipules between the petioles. Calyx-scales in fruit covered with orange-colored resinous grains, in which the peculiar bitterness and aroma of the hop reside. (Name thought to be a diminutive of *humus*, moist earth, from the alluvial soil where the Hop spontaneously grows.)

1. **H. Lùpulus,** L. — Banks of streams; not rare, especially westward. July. (Eu.)

ORDER 105. PLATANÀCEÆ. (PLANE-TREE FAMILY.)

Trees, with watery juice, alternate palmately-lobed leaves, sheathing stipules, and monœcious flowers in separate and naked spherical heads, destitute of calyx or corolla; the fruit club-shaped 1-*seeded nutlets, furnished with bristly down along the base:* consists only of the genus

1. PLÁTANUS, L. PLANE-TREE. BUTTONWOOD.

Sterile flowers of numerous stamens with club-shaped little scales intermixed: filaments very short. Fertile flowers in separate catkins, consisting of inversely pyramidal ovaries mixed with little scales. Style rather lateral, awl-shaped, or thread-like, simple. Nutlets coriaceous, small, tawny-hairy below, containing a single orthotropous pendulous seed. Embryo in the axis of thin albumen. (The ancient name, from πλατύς, *broad*, in allusion to the ample shade of its foliage.)

1. **P. occidentàlis,** L. (American Plane or Sycamore.) Leaves angularly sinuate-lobed or toothed, the short lobes sharp-pointed; fertile heads solitary, suspended on a long peduncle. — Alluvial river-banks; very common, especially westward. May. — A very large and well-known tree, with a white bark separating early in thin brittle plates.

Order 106. JUGLANDÀCEÆ. (Walnut Family.)

Trees, with alternate pinnate leaves, without stipules; the sterile flowers in catkins (aments) with an irregular calyx; the fertile solitary or in small clusters, with a regular 3 – 5-lobed calyx adherent to the incompletely 2 – 4-celled but only 1-ovuled ovary. Fruit a kind of dry drupe, with a bony endocarp (nut-shell), containing a large 4-lobed orthotropous seed. Albumen none. Cotyledons fleshy and oily, sinuous, 2-lobed: radicle short, superior. Petals sometimes present in the fertile flowers. — A small family of important trees, consisting chiefly of the two following genera.

1. JÙGLANS, L. Walnut.

Sterile flowers in long and simple lateral catkins; the calyx adherent to the entire bracts or scales, unequally 3 – 6-cleft. Stamens 8 – 40: filaments very short. Fertile flowers solitary or several together on a peduncle at the end of the branches, with a 4-toothed calyx, bearing 4 small petals at the sinuses. Styles 2, very short: stigmas 2, somewhat club-shaped and fringed. Fruit with a fibrous-fleshy indehiscent epicarp, and a mostly rough irregularly furrowed endocarp or nut-shell. — Trees with strong-scented or resinous-aromatic bark, &c., nearly naked buds (3 or 4 superposed, and the uppermost far above the axil), and odd-pinnate leaves of many serrate leaflets. Pith in plates. (Name contracted from *Jovis glans*, the nut of Jupiter.)

1. **J. cinèrea,** L. (Butternut.) Leaflets oblong-lanceolate, pointed, rounded at the base, downy, especially underneath, the *petioles and branchlets downy with clammy hairs; fruit oblong, clammy,* pointed, the nut deeply sculptured and rough with ragged ridges. — Rich woods; common. May: fruit ripe in Sept. — Tree 30° - 50° high, with gray bark and widely spreading branches; wood lighter-colored than in the next.

2. **J. nìgra,** L. (Black Walnut.) Leaves ovate-lanceolate, taper-pointed, somewhat heart-shaped or unequal at the base, smooth above, the lower surface and the *petioles minutely downy; fruit spherical,* roughly dotted, the nut corrugated. — Rich woods; rare in the Eastern, very common in the Western States. May: fruit ripe in Oct. — A large and handsome tree, with brown bark, and valuable purplish-brown wood turning blackish with age. Seed sweet, more

pleasant-tasted and less oily than the butternut, but greatly inferior to the European walnut (J. RÈGIA).

2. CÁRYA, Nutt. HICKORY.

Sterile flowers in slender lateral catkins which are mostly in threes on a common peduncle: calyx naked, unequally 3-parted. Stamens 3 – 8: filaments nearly wanting. Fertile flowers 2 – 3 together at the end of the branches, with a 4-toothed calyx: petals none. Stigma large, 4-lobed. Fruit globular, with a rather fleshy and at length leathery epicarp or husk, which splits into 4 valves, and falls away when ripe from the smooth and slightly 4 – 6-angled incompletely 4-celled endocarp or nut-shell. — Trees with hard and very tough wood, and odd-pinnate leaves of 5 – 9 leaflets; the two sorts of flowers from the same scaly buds with these, the sterile aments borne below the leaves. Pith continuous. (Καρύα, an ancient name of the Walnut.) All flower in May, and shed their nuts in October.

* *Seed edible and delicious: husk of the fruit completely 4-valved (falling away in 4 separate pieces at maturity).*

+ *Fruit and nut elongated-oblong; the husk thin: bark of the trunk not shaggy.*

1. **C. olivæfórmis,** Nutt. (PECAN-NUT.) Nearly smooth; leaflets 13 – 15, oblong-lanceolate, serrate, somewhat falcate; nut olive-shaped, with a thin shell. — River-banks, from Illinois southward. — A slender tree; its delicious nuts well-known.

+ + *Fruit globular, its husk very thick: bark of old trunk shaggy, exfoliating in strips or plates: buds large and very scaly.*

2. **C. álba,** Nutt. (SHELL-BARK or SHAG-BARK HICKORY.) *Leaflets* 5, minutely downy underneath, finely serrate, the 3 upper obovate-lanceolate, *the lower pair much smaller* and oblong-lanceolate, all taper-pointed; *fruit depressed-globular; nut somewhat flattened, nearly pointless,* with a rather thin whitish shell and a large kernel. — Rich moist woods; common. A tall and handsome tree, the old trunks very rough-barked: wood most valuable as timber, and for fuel; while the fruit furnishes the principal *hickory-nuts* of the market.

3. **C. sulcàta,** Nutt. (THICK SHELL-BARK HICKORY.) *Leaflets* 7 – 9, obovate-lanceolate, sharply serrate, downy underneath; *fruit oval, 4-ribbed above the middle with intervening furrows; nut strongly pointed,* slightly flattened, with a thick yellowish shell. — Rich woods, Penn. to Illinois and Kentucky. — Nuts nearly as sweet as in the last.

* * *Seed sweetish, but small: valves of the husk not separating to the base: nut hard-shelled: bark not shaggy.*

4. **C. tomentòsa,** Nutt. (MOCKER-NUT. WHITE-HEART HICKORY.) *Leaflets* 7 – 9, oblong- or obovate-lanceolate, slightly serrate, *roughish-downy underneath* as well as the petiole; *catkins hairy; fruit globular or ovoid, with a thick and hard husk,* which splits almost to the base; nut somewhat 6-angled, the *shell very thick* and hard (light brown). Rich woods; common, especially southward and westward. — A tall tree with resinous-scented foliage, and cracked bark on the larger trunks; the wood celebrated for its excellence as fuel. The small

kernel is difficult of extraction from the thick and bony nut. — A var. MÁXIMA, Nutt., bears fruit "as large as an apple," with an exceedingly thick husk.

5. **C. microcárpa,** Nutt. (SMALL-FRUITED HICKORY.) *Leaflets* 5-7, oblong-lanceolate, serrate, *glandular underneath* (not downy); *catkins smooth; fruit roundish-ovoid, with a thin husk;* nut slightly 4-angled, the *shell rather thin.* — Moist woodlands, Penn. (N. England ?) and southwestward. — Fruit only ½′ in diameter, shaped like that of the last; the foliage much as in the next.

6. **C. glàbra,** Torr. (PIG-NUT or BROOM HICKORY.) *Leaflets* 5-7, ovate-lanceolate, serrate, *smooth* or nearly so; *fruit pear-shaped or roundish-obovate, thin,* splitting about half-way down into 4 coriaceous valves; nut hard and tough, with a sweetish or bitterish small kernel. (C. porcina, *Nutt.*) — Woodlands; common. — A large tree, with a close bark, very tough and valuable wood, and exceedingly tough sprouts (used as *hickory withes*): the fruit and nuts of variable form.

* * * *Seed intensely bitter: husk thin and soft: bark smooth: buds little scaly.*

7. **C. amàra,** Nutt. (BITTER-NUT or SWAMP HICKORY.) Leaflets 7-11, oblong-lanceolate, serrate, smooth; fruit globular, with ridged or prominent seams opening half-way down; nut inversely heart-shaped, its shell thin and fragile. — Wet woods; common. — A graceful tree; the timber inferior to the other Hickories. Nut-shell so fragile that it may be crushed with the hand; the bitter kernel remarkably corrugated.

ORDER 107. CUPULÍFERÆ. (OAK FAMILY.)

Trees or shrubs, with alternate and simple straight-veined leaves, deciduous stipules, and monœcious flowers; the sterile in catkins (aments) (or capitate-clustered in the Beech); *the fertile solitary or clustered, furnished with an involucre which forms a cup or covering to the* 1-*celled* 1-*seeded nut.* Ovary 2-7-celled, with 1-2 pendulous anatropous ovules in each cell; but all the cells and ovules except one disappearing in the fruit. Calyx adherent to the ovary, the minute teeth crowning its summit. Seed with no albumen, filled with the embryo: cotyledons very thick and fleshy: radicle short, superior.

Synopsis.

* Fertile flowers scattered or few in a cluster.

1. QUERCUS. Involucre 1-flowered, of many imbricated small scales, forming a cup around the base of the hard and rounded nut.
2. CASTANEA Involucre 2-3-flowered, forming a prickly bur enclosing 1-3 coriaceous nuts, opening at length by 4 valves.
3. FAGUS Involucre 2-flowered, rather prickly, 4-valved, enclosing 2 sharply triangular nuts. Sterile flowers in capitate clusters.
4. CORYLUS Involucre 1-2-flowered, formed of 2-3 confluent scales, which become leafy-coriaceous, much enlarged and cut or torn at the apex, enclosing a bony nut.

* * Fertile flowers clustered in a kind of ament.

5. CARPINUS. Involucre a separate open leaf, 2-flowered. Fruit a small ovoid nut.
6. OSTRYA. Involucre a bladdery bag, 1-flowered, enclosing the seed-like nut.

1. QUÉRCUS, L. Oak.

Sterile flowers clustered in slender and naked drooping catkins, without bracts calyx 6 – 8-parted: stamens 6 – 12: anthers 2-celled. Fertile flowers scattered or somewhat clustered, consisting of a 3-celled and 6-ovuled ovary, with a 3-lobed stigma, enclosed by a scaly bud-like involucre which becomes an indurated cup (*cupule*) around the base of the rounded nut or acorn. Cotyledons remaining underground in germination. — Flowers greenish or yellowish, the fertile ones inconspicuous. Aments several from the same scaly bud. (The classical Latin name.) All flower in spring, and shed their nuts in October.

§ 1. *Fruit ripening the first year, mostly peduncled: leaves not bristly-toothed or pointed.*

* *Leaves sinuate-lobed or pinnatifid, all pale, whitish, or grayish-downy underneath.* — White Oaks.

1. **Q. macrocárpa,** Michx. (Bur-Oak. Over-cup or Mossy-cup White-Oak.) *Leaves* obovate or oblong, *lyrately-pinnatifid or deeply sinuate-lobed*, irregular, downy or pale beneath; the lobes sparingly and obtusely toothed, or the smaller ones entire; *cup deep*, conspicuously imbricated, of hard and thick *pointed scales, the upper ones awned*, so as to make a mossy-fringed border; *acorn* ovoid (1′ – 1½′ long), *half immersed in or entirely enclosed by the cup.* — Dry woods, along rivers, &c., W. New England to Wisconsin, Kentucky, and southwestward. — A handsome, middle-sized tree. Cup very variable, especially in size, from ¾′ to 2′ across.

Var. **olivæfórmis** (Q. olivæformis, *Michx.*) is plainly a mere state of this (figured by Michaux with unripe or imperfect fruit), with narrower and more deeply lobed leaves, and oblong acorns and cups: growing with the ordinary form.

2. **Q. obtusiloba,** Michx. (Post-Oak. Rough or Box White-Oak.) *Leaves grayish-downy underneath, pale and rough above, thickish*, sinuately cut into 5 – 7 roundish divergent lobes, the upper ones much larger and often 1 – 3-notched; *cup saucer-shaped, naked, about one third the length of the ovoid acorn.* (Q. stellàta, *Willd.*) — Sandy or sterile soil, from the coast of Massachusetts and from Wisconsin southward. — A small tree, with very durable wood. Acorns ½′ to ¾′ long, nearly sessile.

3. **Q. álba,** L. (White Oak.) Mature *leaves smooth, pale or glaucous underneath, bright green above*, obovate-oblong, obliquely and moderately or deeply cut into 3 – 9 oblong or linear and obtuse mostly entire lobes; *cup hemispherical-saucer-shaped, rough or tubercled at maturity, naked, much shorter than the ovoid or oblong acorn.* — Rich woods; common. — A well-known and invaluable large tree. Lobes of the leaves short and broad 3 – 5, or 5 – 9 and narrow. Acorn about 1′ long; the kernel sweet and edible.

* * *Leaves coarsely sinuate-toothed, but not lobed, whitish and more or less downy beneath: cup hoary: acorns sweet-tasted.* — Chestnut-Oaks.

4. **Q. Prìnus,** L. (Swamp Chestnut-Oak.) *Leaves obovate or oblong-obovate*, coarsely and somewhat uniformly dentate with rounded teeth, downy beneath, glabrous above; *cup* hemispherical (either abrupt or with a small top-shaped base), *thick*, tubercled when old, nearly half or one third the length of

the ovoid large acorn. — Low, alluvial grounds, &c.; common from Penn. southward. — A fine tree; its wood inferior to the White Oak. — Acorn fully 1′ long; the cup of nearly the same diameter.

Var. **montícola,** Michx. (ROCK CHESTNUT-OAK.) Acorn ovoid-oblong, 1¼′ long. (Q. montana, *Willd.*) — Apparently only a form of the Swamp Chestnut-Oak, growing in rocky or hilly woodlands; W. New England to Ohio and southward, especially along the Alleghanies. From the different soil, the timber is more valuable.

Var. **díscolor,** Michx. (SWAMP WHITE-OAK.) Leaves unequally and more deeply sinuate-toothed, often *almost sinuate-pinnatifid, whitish-downy beneath,* bright green above; cup with the scales more pointed, the upper sometimes awned, and forming a fringed margin; acorns 1′ or less long. (Q. bícolor, *Willd.*) — Low grounds; common throughout. — A marked variety; but probably nothing more.

5. **Q. Castànea,** Willd. (YELLOW CHESTNUT-OAK.) *Leaves oblong-lanceolate or oblong, acute,* hoary-white and minutely downy underneath, *equally and rather sharply toothed; cup* hemispherical, *thin,* of small appressed scales, acorn ovoid or oblong, small. — Rich woods, W. New England to Wisconsin and southward. — This has the leaves shaped more like those of the Chestnut than any other, which, with the small fruit, distinguishes it from the last. Cup ½′ across, fine-scaled: acorns ¾′ long. Tree middle-sized.

6. **Q. prinoìdes,** Willd. (CHINQUAPIN or DWARF CHESTNUT-OAK.) *Leaves obovate and lanceolate oblong, coarsely wavy-toothed,* downy underneath; peduncles short or none; *cup* hemispherical, *thin;* acorn ovoid, small (about as large as in No. 5). (Q. Chinquapin, *Pursh.*) — Sandy soil, New England, and Albany, New York, to Ohio, Kentucky, and southward. — Shrub 2°-6° high.

§ 2. *Fruit not maturing until the second year, sessile or nearly so: kernel bitter.*

* *Leaves evergreen, entire or nearly so, hoary beneath.* — LIVE OAKS.

7. **Q. virens,** Ait. (LIVE OAK.) *Leaves obtuse,* coriaceous, oblong or elliptical, hoary beneath; *cup top-shaped; acorn oblong.* — Coast of Virginia and southward. Farther south becoming a large and invaluable tree.

8. **Q. cinèrea,** Michx. (UPLAND WILLOW-OAK.) *Leaves acute,* lanceo-oblong, white-downy beneath; *cup saucer-shaped; acorn globular.* — Pine barrens, Virginia and southward. A small tree.

* * *Leaves deciduous, entire, narrow.* — WILLOW-OAKS.

9. **Q. Phéllos,** L. (WILLOW-OAK.) *Leaves linear-lanceolate, narrowed to both ends, smooth,* light green; cup saucer-shaped; acorn globular. — Sandy low woods, Long Island and New Jersey to Kentucky and southward. — Tree 30°-50° high, remarkable for the willow-like leaves, which are 3′-4′ long. Fruit small.

10. **Q. imbricària,** Michx. (LAUREL or SHINGLE OAK.) *Leaves lanceolate-oblong, mucronate,* thickish, smooth and *shining above, somewhat downy underneath;* cup saucer-shaped; acorn globular. — Barrens and open woodlands, New Jersey to Wisconsin and southward. — Tree 30°-50° high; the wood used for shingles in the Western States, whence the name.

* * * *Leaves deciduous, but rather coriaceous, mostly dilated upwards and obscurely lobed or entire in the same individual, sometimes more conspicuously lobed, often more or less bristle-pointed at the summit and extremities of some of the larger veins.*

11. **Q. aquática,** Catesby. (WATER-OAK.) *Leaves glabrous and shining, obovate-spatulate or narrowly wedge-form, with a long tapering base,* varying to oblanceolate; cup saucer-shaped or hemispherical, of fine and close scales, much shorter than the globular acorn. — Wet grounds, around ponds, &c., Maryland to Virginia and southward. — Tree 30° – 40° high. Acorn ½' long; the cup of the same width.

12. **Q. nigra,** L. (BLACK-JACK or BARREN OAK.) *Leaves broadly wedge-shaped,* but mostly rounded or obscurely cordate at the base, *widely dilated* and somewhat 3-lobed (rarely 5-lobed) at the summit, occasionally with one or two lateral lobes or teeth, rusty-pubescent beneath, shining above, large (4' – 9' long); *cup top-shaped,* coarse-scaly, covering half of the short ovoid acorn. (Q. ferruginea, *Michx.*) — Dry sandy barrens, from Long Island, New York, to Illinois, and southward. — Tree 8° – 25° high. Acorn ½' – ¾' long. Leaves occasionally rather deeply lobed, the lobes strongly bristle-pointed. — Under the name of Q. TRIDENTÀTA, Dr. Engelmann distinguishes a remarkable Oak, apparently a hybrid between this and Q. imbricaria. — Under this section the following remarkable forms, by some regarded as species, would be sought, viz.: —

Q. LÈANA, Nutt. (LEA'S OAK), of which single trees are known near Cincinnati, Ohio, and Augusta, Illinois (*Mead*), is probably a hybrid between Q. imbricaria and Q. tinctoria, or possibly Q. nigra.

Q. HETEROPHÝLLA, Michx. (BARTRAM OAK), was — for it no longer exists — apparently a hybrid between Q. Phellos and Q. tinctoria?

* * * * *Leaves deciduous, lobed or pinnatifid, long-petioled, the tips of the lobes bristle-pointed.* — BLACK and RED OAKS.

+ *Mature leaves downy underneath.*

13. **Q. ilicifòlia,** Wang. (BEAR or BLACK SCRUB-OAK.) *Dwarf; leaves obovate, wedge-shaped at the base, angularly about 5-lobed, whitened-downy underneath;* cup flattish-top-shaped; acorn ovoid. — Sandy barrens and rocky hills, New England to Ohio and W. Virginia. (Q. Banistèri, *Michx.*) — A straggling, crooked shrub, 3° – 8° high. Leaves 2' – 4' long, thickish. Acorns barely ½' long.

14. **Q. falcàta,** Michx. (SPANISH OAK.) *Leaves grayish-downy underneath,* obtuse or rounded at the base, 3 – 5-*lobed above; the lobes prolonged, mostly narrow and more or less scythe-shaped,* especially the terminal one, entire or sparingly cut-toothed; *cup saucer-shaped; acorn spherical* or somewhat depressed (½' long). — Dry or sandy soil, from New Jersey and Penn. southward. — A small or large tree, extremely variable in foliage: a variety with shorter lobes is Q. tríloba, *Willd.*

+ + *Mature leaves glabrous on both sides or nearly so.*

++ *Cup conspicuously scaly, more or less top-shaped or contracted at the base: acorn one third or nearly half immersed.*

15. **Q. tinctòria,** Bartram. (QUERCITRON or BLACK OAK. YELLOW-BARKED OAK.) *Leaves more or less rusty-pubescent when young,* nearly glabrous

when old, *obovate-oblong, slightly or deeply sinuate-pinnatifid*, the lobes somewhat toothed; *acorn nearly spherical* or depressed-globular (½′ – ¾′ long). — Dry woods; common. — A large tree, often confounded with the next, especially the varieties with deeper cut leaves; but these are duller and thicker, more dilated above the middle, somewhat downy underneath until midsummer, and turning yellowish-brown after frost; and the inner bark (*quercitron* of dyers) is very thick and yellow. Wood reddish, coarse-grained, but valuable.

16. **Q. coccínea,** Wang. (SCARLET OAK.) *Leaves oval or oblong in outline, deeply sinuate-pinnatifid, with broad and open sinuses*, and divergent sparingly cut-toothed lobes (3 – 4 on each side), *smooth, bright green and shining both sides*, broad or truncate at the base; *acorn ovoid or globular* (½′ – ¾′ long). — Rich woods; common. — A large tree; the long-petioled shining leaves turning bright scarlet in autumn: timber and bark less valuable than in the last.

++ ++ *Cup of fine scales, shallow and saucer-shaped, much shorter than the acorn.*

17. **Q. rùbra,** L. (RED OAK.) *Leaves oblong, smooth, pale beneath, sinuately cut with rather narrow sinuses into short* and entire or sparingly toothed acute *spreading lobes* (4 – 6 on each side); *acorn ovoid or oblong*, turgid (1′ long). (Q. ambigua, *Michx.*) — Rocky woods; common. — A good-sized tree, with reddish very porous and coarse-grained wood, of little value as timber. Leaves turning dark red after frost: the sinuses extending scarcely half-way to the midrib.

18. **Q. palústris,** Du Roi. (SWAMP SPANISH, or PIN OAK.) *Leaves oblong, smooth and shining, bright green both sides, deeply pinnatifid, with broad and rounded sinuses; the lobes divergent, cut-lobed and toothed*, acute; *acorn globular* (scarcely ½′ long). — Low grounds, along streams, S. New York to Wisconsin. — A very handsome middle-sized tree, with light and elegant foliage; the sinuses of the leaves reaching three fourths of the way to the midrib. The timber is better than that of the Red Oak.

2. CASTÀNEA, Tourn. CHESTNUT.

Sterile flowers interruptedly clustered in long and naked cylindrical catkins: calyx 5 – 6-parted: stamens 8 – 15: anthers 2-celled. Fertile flowers 2 or 3 together in an ovoid scaly prickly involucre: calyx with a 5 – 6-lobed border crowning the 3 – 7-celled 16 – 14-ovuled ovary: abortive stamens 5 – 12: stigmas bristle-shaped, as many as the cells of the ovary. Nuts coriaceous, ovoid, enclosed 2 – 3 together or solitary in the hard coriaceous and very prickly 4-valved involucre. Cotyledons very thick, somewhat plaited, cohering together, remaining underground in germination. — Leaves strongly straight-veined. Flowers appearing later than the (undivided) leaves; the catkins axillary near the end of the branches, cream-color; the fertile flowers at their base. (The classical name, from that of a town in Thessaly.)

1. **C. vésca,** L. (CHESTNUT.) *Leaves oblong-lanceolate, pointed*, serrate with coarse pointed teeth, *smooth and green both sides;* nuts 2 or 3 in each involucre, therefore flattened on one or both sides. — Rocky or hilly woods, Maine to Michigan and Kentucky; common. June, July. — A large tree, with light coarse-grained wood The American variety bears smaller and sweeter nuts than the European. (Eu.)

2. **C. pùmila,** Michx. (Chinquapin.) *Leaves oblong, acute,* **serrate with pointed teeth,** *whitened-downy underneath;* nut solitary, not flattened. — Sandy woods, from (Long Island?) S. Penn. and Ohio, southward. June. — Shrub or tree 6° – 20° high. Involucres small, often spiked; the ovoid pointed nut scarcely half as large as a common chestnut, very sweet.

3. FÀGUS, Tourn. Beech.

Sterile flowers in small heads on drooping peduncles, with deciduous scale-like bracts: calyx bell-shaped, 5 – 6-cleft: stamens 8 – 12: anthers 2-celled. Fertile flowers usually in pairs at the apex of a short peduncle, invested by numerous awl-shaped bractlets, the inner grown together at their bases to form the involucre: calyx-lobes 4 – 5, awl-shaped: ovary 3-celled with 2 ovules in each cell: styles 3, thread-like, stigmatic along the inner side. **Nuts sharply 3-sided,** usually 2 in each urn-shaped and soft-prickly coriaceous involucre, which splits to below the middle into 4 valves. Cotyledons thick, folded and somewhat united; but rising and expanding in germination. Trees with smooth ash-gray bark, undivided strongly straight-veined leaves, and a light horizontal spray. Scales of the taper buds formed of scarious stipules. Flowers yellowish, appearing with the leaves: peduncles axillary at the base of the branchlets. (The classical name, from φάγω, *to eat*, in allusion to the esculent nuts.)

1. **F. ferruginea,** Ait. (American Beech.) Leaves oblong-ovate, taper-pointed, distinctly and often coarsely toothed; petioles and midrib soon nearly naked; prickles of the fruit recurved or spreading. (F. ferruginea and F. sylvéstris, *Michx. f.*) — Woods; common, especially northward, and along the Alleghanies southward. May. — Leaves longer and less shining than in the European Beech, most of the silky hairs early deciduous; the lower surface then nearly smooth.

4. CÓRYLUS, Tourn. Hazel-nut. Filbert.

Sterile flowers in drooping cylindrical catkins; the concave bracts and the 2-cleft calyx combined into 3-lobed scales, to the axis of which the 8 short filaments irregularly cohere: anthers 1-celled. Fertile flowers several together in lateral and terminal scaly buds. Ovary 2-celled with 1 ovule in each: stigmas 2, thread-like. Nut bony, ovoid, separately enclosed in a large leafy-coriaceous involucre, which is composed of 2 or 3 united bracts tubular at the base, and lacerated above. — Shrubs flowering in early spring, before the (roundish unequally serrate) leaves appear. (The classical name, probably from κόρυς, *a helmet*, from the involucre.)

1. **C. Americàna,** Walt. (Wild Hazel-nut.) *Leaves roundish-heart-shaped,* pointed, coarsely serrate; *involucre glandular-downy, with a dilated flattened border,* about twice the length of the globular nut. — Thickets; common. — Shrub 4° – 8° high; the young twigs, &c., downy and glandular-hairy. Nut of fine flavor, but smaller and thicker-shelled than the European Hazel-nut.

2. **C. rostràta,** Ait. (Beaked Hazel-nut.) *Leaves ovate or ovate-oblong, somewhat heart-shaped,* pointed, doubly serrate; *involucre much prolonged* above the globular-ovoid nut *into a narrow tubular beak, densely bristly.* — Banks

of streams, &c.; common northward and along the Alleghanies. — Shrub 2° - 5° high, with slender smooth branches.

5. CARPÌNUS, L. HORNBEAM. IRON-WOOD.

Sterile flowers in drooping cylindrical catkins, consisting of about 12 stamens in the axil of a simple and entire scale-like bract, destitute of a proper calyx: filaments very short: anthers 1-celled, bearded at the apex. Fertile flowers several, spiked in a sort of loose terminal catkin, with small deciduous bracts, each subtending a pair of flowers, consisting of a 2-celled 2-ovuled ovary terminated by 2 thread-like stigmas. Nut small, ovoid, ribbed, stalked, each with a simple, 1-sided, enlarged, open and leaf-like involucre. — Trees with a smooth gray bark, slender buds like the Beech, and foliage resembling the Beech or Birch, appearing later than the flowers. (The ancient Latin name.)

1. **C. Americàna,** Michx. (AMERICAN HORNBEAM. BLUE or WATER BEECH.) Leaves ovate-oblong, pointed, sharply doubly serrate, nearly smooth; involucral leaf 3-lobed, halberd-shaped, sparingly cut-toothed on one side. — Along streams; common. — Tree 10° - 20° high, with a ridged trunk, and very hard whitish wood; called, indiscriminately with the next, *Iron-wood.*

6. ÓSTRYA, Micheli. HOP-HORNBEAM. IRON-WOOD.

Sterile flowers nearly as in Carpinus: filaments irregularly somewhat united. Fertile flowers numerous in a short terminal catkin, with small deciduous bracts; each enclosed in a membranous sac-like involucre which enlarges and forms a bladdery closed bag in fruit, these imbricated to form a sort of strobile appearing like that of the Hop. Ovary 2-celled, 2-ovuled, crowned with the entire and bearded border of the calyx, forming a small and smooth nut. — Slender trees with very hard wood, brownish finely furrowed bark, and foliage, &c. nearly as in the last genus. Flowers appearing with the leaves. (The classical name.)

1. **O. Virgínica,** Willd. (AMERICAN HOP-HORNBEAM. LEVER-WOOD.) Leaves oblong-ovate, taper-pointed, very sharply doubly serrate, downy beneath; buds acute; involucral sacs bristly-hairy at the base. — Rich woods, not rare. April, May; the large and handsome oval-oblong hop-like fruit full grown in Aug. — Tree 20° - 40° high.

ORDER 108. MYRICÀCEÆ. (SWEET-GALE FAMILY.)

Monœcious or diœcious shrubs, with both kinds of flowers in short scaly catkins, and resinous-dotted often fragrant leaves, — differing from the Birch Family chiefly by the 1-celled ovary with a single erect orthotropous ovule, and the drupe-like nut. Involucre none.

1. MYRÌCA, L. BAYBERRY. WAX-MYRTLE.

Flowers diœcious: the sterile in oblong or cylindrical, the fertile in ovoid catkins, closely imbricated; both destitute of calyx and corolla, solitary under a scale-like bract and with a pair of bractlets. Stamens 2–8: filaments somewhat united below. Ovary with 3 scales at its base, and 2 thread-like stigmas. Fruit a small globular nut, studded with resinous grains or wax. (Μυρίκη, the ancient name of the Tamarisk or some other shrub; perhaps from μυρίζω, *to perfume.*)

1. **M. Gàle,** L. (Sweet Gale.) *Leaves wedge-lanceolate,* serrate towards the apex; *pale, later than the flowers; sterile catkins closely clustered;* nuts in imbricated heads, enclosed in the thick pointed ovate scales which coalesce with its base. — Wet borders of ponds, New England to Virginia in the mountains, Penn., Wisconsin, and northward. April. — Shrub 3°–5° high. (Eu.)

2. **M. cerífera,** L. (Bayberry. Wax-Myrtle.) *Leaves oblong-lanceolate,* narrowed at the base, entire or wavy-toothed towards the apex, *shining and resinous-dotted both sides, somewhat preceding the flowers; sterile catkins scattered,* oblong; scales wedge-shaped at the base; nuts scattered and naked, incrusted with white wax. — Sandy soil on and near the sea-shore: also on Lake Erie. May. — Shrub 3°–8° high, with fragrant leaves: the catkins sessile along the last year's branches; the fruits sometimes persistent for 2 or 3 years.

2. COMPTÒNIA, Solander. Sweet Fern.

Flowers monœcious; the sterile in cylindrical catkins, with kidney-heart-shaped pointed scale-like bracts, and 3–6 stamens; the fertile in globular aments, bur-like: ovary surrounded by 5 or 6 long linear-awl-shaped scales, persistent around the ovoid-oblong smooth nut: otherwise as in Myrica. — Leaves linear-lanceolate, pinnatifid with many rounded lobes, thin, appearing rather later than the flowers. Stipules half heart-shaped. (Named after *Henry Compton,* Bishop of London a century ago, a cultivator and patron of botany.)

1. **C. aspleniifòlia,** Ait. — Sterile hills, E. New England to Virginia. Also N. Wisconsin. April, May. — Shrub, 1°–2° high, with sweet-scented fern-like leaves.

Order 109. BETULÀCEÆ. (Birch Family.)

Monœcious trees or shrubs, with both kinds of flowers in scaly catkins, 2 *or* 3 *under each bract, and no involucre to the naked* 1*-celled and* 1*-seeded often winged nut, which results from a* 2*-celled and* 2*-ovuled ovary;* — otherwise much as in the Oak Family.

1. BÉTULA, Tourn. Birch.

Sterile flowers 3, and bractlets 2, under each scale or bract of the catkins, consisting each of a calyx of one scale and 4 stamens attached to its base: filaments very short: anthers 1-celled. Fertile flowers 3 under each 3-lobed bract, with no separate bractlets and no calyx, each of a naked ovary with 2 thread-like stigmas, becoming a broadly winged and scale-like nutlet or small samara. Seed suspended, anatropous. Cotyledons flattish, oblong. — Outer bark usually separable in thin horizontal sheets, that of the branchlets dotted. Twigs and leaves often spicy-aromatic. Foliage mostly thin and light. Buds sessile, scaly Sterile catkins long and drooping, terminal and lateral, formed in summer, remaining naked through the succeeding winter, and expanding their golden flowers in early spring, preceding the leaves: fertile catkins oblong or cylindrical, lateral, protected by scales through the winter, and developed with the leaves. (The ancient Latin name.)

* *Trees, with the bark of the trunk white externally, separable in thin sheets: petioles slender: fertile catkins cylindrical, peduncled, spreading or drooping.*

1. **B. álba,** var. **populifòlia,** Spach. (AMERICAN WHITE BIRCH.) *Leaves triangular* (deltoid), *very taper-pointed,* truncate or nearly so at the broad base, *smooth and shining both sides* (glandular-dotted when young). (B. populifòlia, *Ait.*) — Common on poor soils, Penn. to Maine, near the coast. — A small and slender, very graceful tree, with chalky-white bark, much less separable into sheets than the next species; the very long-pointed leaves on petioles of fully half their length, tremulous as those of an Aspen. (Eu.)

2. **B. papyràcea,** Ait. (PAPER BIRCH. CANOE BIRCH.) *Leaves ovate, taper-pointed,* heart-shaped or abrupt (or rarely wedge-shaped) at the base, *smooth above, dull underneath;* lateral lobes of the fruit-bearing bracts short and rounded. — Woods, New England to Wisconsin, almost entirely northward, and extending far north. — A large tree, with fine-grained wood, and very tough durable bark splitting into paper-like layers. Leaves dark-green above, pale, glandular-dotted, and a little hairy on the veins underneath, sharply and unequally doubly serrate, 3 – 4 times the length of the petiole. There is a dwarf mountain variety.

* * *Trees, with reddish-brown or yellowish bark: petioles short: fertile catkins ovoid-oblong, scarcely peduncled.*

3. **B. nìgra,** L. (RIVER or RED BIRCH.) *Leaves rhombic-ovate, acutish at both ends,* whitish and (until old) downy underneath; fertile catkins oblong, somewhat peduncled, woolly; the bracts with oblong-linear nearly equal lobes. (B. rubra, *Michx. f.*) — Low river-banks, Massachusetts to Virginia and southward. — A rather large tree, with reddish-brown bark and compact light-colored wood: leaves somewhat Alder-like, glandular-dotted, sharply doubly serrate.

4. **B. excélsa,** Ait. (YELLOW BIRCH.) *Leaves ovate or elliptical,* pointed, narrowed (but mostly heart-shaped) at the base, *smoothish,* unequally serrate with coarse and very sharp teeth; *fruiting catkins ovoid-oblong, slightly hairy; lobes of the scales nearly equal, acute, slightly diverging.* — Moist woods, New England to Lake Superior, and northward. — Tree 40° – 60° high, with yellowish silvery bark, thin leaves: twigs less aromatic than in the next; the wood less valuable.

5. **B. lénta,** L. (CHERRY BIRCH. SWEET or BLACK BIRCH.) *Leaves heart-ovate,* pointed, sharply and finely doubly serrate, *hairy on the veins beneath; fruiting catkins elliptical, thick, somewhat hairy; lobes of the veiny scales nearly equal, obtuse, diverging.* — Moist rich woods, New England to Ohio and northward, and southward in the mountains. — A rather large tree, with dark chestnut-brown bark, reddish bronze-colored on the spray, much like that of the Garden Cherry, which the leaves also somewhat resemble; the twigs and foliage spicy-aromatic: timber rose-colored, fine-grained, valuable for cabinet-work.

* * * *Shrubs, with brownish bark and rounded crenate-toothed leaves; fertile catkins very short-peduncled.*

6. **B. pùmila,** L. (Low Birch.) *Erect or ascending; leaves obovate or roundish-elliptical,* coarsely crenate-toothed, those of the summer branchlets downy and nearly orbicular; *fruiting catkins cylindrical;* the scales more or less unequally 3-lobed; *fruit broadly winged.* (B. glandulòsa, *Michx.*) — Bogs, N. New England (rare), Penn., Ohio, Wisconsin, and northward. — Shrub 2° - 8° high, with smooth, or sometimes resinous-warty, branchlets; the growing twigs downy. Leaves thickish, 1' - 1½' long, paler or whitish underneath.

7. **B. nàna,** L. (Dwarf or Alpine Birch.) *Branches spreading or procumbent; leaves orbicular,* deeply crenate, smooth, reticulated-veiny underneath; *fruiting catkins oblong;* the scales nearly equally 3-cleft; *fruit narrowly winged.* — Alpine summits of the mountains of Maine, New Hampshire, and N. New York, and high northward. — Shrub 10' - 24' high, with leaves about ½' wide: varying, in less frigid stations, with the larger leaves twice that size, and the branchlets often conspicuously warty with resinous dots, when it is B. rotundifolia, *Spach,* and B. Littelliana, *Tuckerm.* (Eu.)

2. ÁLNUS, Tourn. Alder.

Sterile catkins elongated and drooping, with 5 bractlets and 1 to 3 flowers under each scale, each flower usually with a 4-parted calyx and 4 stamens: filaments very short: anthers 2-celled. Fertile catkins ovoid or oblong; the fleshy scales each 2-flowered, with a calyx of 4 little scales adherent to the scales or bracts of the catkin, which are thick and woody in fruit, all coherent below, and persistent. — Shrubs or small trees, with stalked leaf-buds furnished with a single scale; the (often racemed or clustered) catkins of both sorts produced at the close of summer, remaining entirely naked through the winter, and expanding in early spring. (The ancient Latin name.)

§ 1. ALNUS Proper. — *Fruit wingless.*

1. **A. incàna,** Willd. (Speckled or Hoary Alder.) *Leaves broadly oval or ovate, rounded at the base,* sharply serrate, often coarsely toothed, *whitened and mostly downy underneath;* stipules oblong-lanceolate; fertile catkins oval; fruit orbicular. (A. glaùca, *Michx.*) — Shrub 8° - 20° high, forming thickets along streams; the common Alder northward from New England to Wisconsin. — Var. glaùca has the leaves pale, but when old quite smooth, beneath. (Eu.)

2. **A. serrulàta,** Ait. (Smooth Alder.) *Leaves obovate, acute at the base,* sharply serrate with minute teeth, thickish, *smooth and green both sides,* a little hairy on the veins beneath; stipules oval; fertile catkins ovoid-oblong; fruit ovate. — Shrub 6° - 12° high, in similar situations; the common Alder from Southern New England to Wisconsin, Kentucky, and southward.

§ 2. ALNÁSTER, Spach. — *Fruit with a winged margin: sterile flowers with a calyx of a single scale, much as in* Birch.

3. **A. víridis,** DC. (Green or Mountain Alder.) Leaves round-oval or ovate, sometimes heart-shaped, glutinous and smooth or softly downy underneath, serrate with very sharp and closely set teeth, on young shoots often

somewhat cut-toothed; fertile catkins long-stalked, ovoid. (A. undulàta, *Willd.* Betula crispa, *Michx.*) — On mountains and along streams which descend from them, N. New England and New York, shore of L. Superior, and northward. Shrub 3° - 8° high. (Eu.)

ORDER 110. SALICÀCEÆ. (WILLOW FAMILY.)*

Diœcious trees or shrubs, with both kinds of flowers in catkins, one under each bract, entirely destitute of calyx or corolla; the fruit a 1*-celled and* 2*-valved pod, containing numerous seeds clothed with a long silky down.* — Ovary 1-celled or imperfectly 2-celled: styles 2, very short, or more or less united, each with a 2-lobed stigma. Seeds ascending, anatropous, without albumen. Cotyledons flattened. — Leaves alternate, undivided, with scale-like and deciduous, or else leaf-like and persistent, stipules. Wood soft and light: bark bitter.

1. SÀLIX, Tourn. WILLOW. OSIER.

Bracts (*scales*) of the catkins entire. Sterile flowers of 2 - 6 (rarely single) stamens, accompanied by 1 or 2 little glands. Fertile flowers also with a small flat gland at the base of the ovary on the inner side: stigmas short. — Trees or shrubs, generally growing along streams, with round flexible branches and large tough roots. Leaves mostly long and pointed, entire or glandularly toothed. Buds covered by a single scale, with an inner adherent membrane (separating in § 2). Catkins appearing before or with the leaves. (The classical name, said to be derived from the Celtic *sal*, near, and *lis*, water.)

§ 1. *Catkins lateral and sessile, appearing before the leaves in April or May: stamens* 2: *scales dark red or brown becoming black, more or less hairy, persistent.*

* *Ovary stalked, downy, hairy, or woolly.*

+– *Catkins ovoid or short-cylindrical, small: leaves entire or obscurely wavy-toothed, hairy or woolly, with prominent veins and more or less revolute margins.* — *Shrubs.*

1. **S. cándida,** Willd. (HOARY WILLOW.) Leaves narrowly lanceolate, taper-pointed, or the lowest obtuse, *the upper surface and young branches covered with a thin web-like wool more white and dense beneath; stipules small, lanceolate, toothed, about the length of the petioles;* catkins oblong-cylindrical, closely flowered; *ovary densely woolly;* style distinct; stigmas 2-cleft; scales oblong, obtuse. (S. incàna, *Michx.*, not of *Schrank.*) — New York and New Jersey to Wisconsin, and northward; in bogs. — Stems 2° - 5° high, with reddish twigs, smooth and shining at maturity. The whole shrub of a very white aspect in exposed situations, but greener in shade.

2. **S. trístis,** Ait. (DWARF GRAY WILLOW.) *Leaves almost sessile, wedge-lanceolate,* pointed, or the lower obtuse, grayish-woolly on both sides, the

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* I am indebted to JOHN CAREY, Esq., for the entire elaboration of this difficult family. (In this second edition I have merely made slight additions respecting the range of some species; and have reduced the Balm of Gilead to a variety of Populus balsamifera.)

upper side becoming nearly smooth at maturity; *stipules minute, hairy, very early deciduous; catkins globular when young, loosely-flowered; ovary with a long tapering beak*, clothed with silvery hairs; *style short; stigmas 2-lobed.* — New England to Wisconsin and southward. — Shrub 1° – 1½° high, much branched: leaves thick, 1½′ long. Stipules seldom seen, often reduced to a mere gland. A variety occurs with very small and rigid contorted leaves.

3. **S. hùmilis,** Marshall. (LOW BUSH WILLOW.) *Leaves petioled*, lanceolate or obovate-lanceolate, acute or obtuse with an abrupt point, slightly downy above, more thickly so, or sometimes grayish-woolly, beneath; *stipules small, semi-ovate and entire, or larger and lunar with 2 – 4 teeth, shorter than the petioles;* catkins often recurved; ovary hairy; *style distinct; stigmas 2-cleft.* (S. Muhlenbergiàna, *Barratt.* S. conìfera, *Muhl.*) — Borders of fields and roadsides; common. — Shrub 3° – 8° high, varying much in size and appearance. The small forms are at times scarcely distinguishable from No. 2, but the leaves are longer, less firm in texture, and generally stipulate; the larger forms, with leaves 3′ – 5′ long and ¾′ – 1′ broad, resemble those of the two next species, but retain more or less down on the under surface at maturity. — The species of this and the following section often bear cone-like excrescences on the ends of the branches, formed of closely imbricated leaves, probably occasioned by the puncture of insects.

+ + *Catkins cylindrical, large, clothed with long glossy hairs: leaves more or less serrate, smooth and shining above, glaucous beneath and at length smooth. — Shrubs or small trees.*

4. **S. díscolor,** Muhl. (GLAUCOUS WILLOW.) Leaves lanceolate or ovate-lanceolate, acute, irregularly toothed on the sides, entire at the base and apex; stipules semilunar, toothed; catkins erect; *scales very hairy, oblanceolate, somewhat acute; ovary densely silky.* (S. sensitìva, *Barratt?*) — Low meadows and river-banks; common. — A large shrub or small tree, 8° – 15° high. The young leaves are commonly obtuse and pubescent, at length becoming smooth and whitish-glaucous beneath. Stipules in the vigorous shoots equalling the petiole, more often small and inconspicuous. Young catkins 1½′ long, glossy, blackish with the conspicuous scales, elongating in fruit to 2½′.

5. **S. eriocéphala,** Michx. (SILKY-HEADED WILLOW.) Leaves oblong-oval, acute, rounded or tapering at base, sparingly and irregularly toothed; stipules semilunar, toothed; *catkins densely flowered, thickly covered with long shining hairs; scales of the sterile ones round-obovate, obtuse; ovary conspicuously stalked, downy.* (S. prinoìdes, *Pursh?* S. cràssa, *Barratt.*) — Low meadows and swamps. — Closely resembles the last; but the aments are more compact and silky, and the scales rounder.

* * *Ovary stalked, silky-gray, shining: catkins ovoid or cylindrical, with a few small leaf-like bracts at the base: leaves finely and evenly serrate, silky-gray or glaucous beneath, drying black: stipules varying from linear to semilunar, toothed, very deciduous. — Shrubs.*

6. **S. serícea,** Marshall. (SILKY-LEAVED WILLOW.) *Leaves* lanceolate, pointed, downy above, *grayish underneath with short silky hairs;* sterile catkins small; *the fertile narrowly cylindrical, closely flowered; scales obtuse,* round-obo

vate, as long as the stalk of the *densely-silky ovoid ovary; stigma 2-lobed, nearly sessile.* (S. grìsea, *Willd.*) — Sandy river-banks; not rare. — Shrub 4°–10° high. Fertile catkins in flower ¾′, at length 1¼′, long; the ovaries not spreading or elongating in fruit, thus appearing sessile.

7. **S. petiolàris,** Smith. (PETIOLED WILLOW.) *Leaves* lanceolate, pointed, smooth above, *slightly silky beneath when young, at length smooth and glaucous; fertile catkins ovoid-cylindrical, loosely flowered, scales very hairy,* obovate, scarcely as long as the stalk of the silky *tapering ovary; style* short but *distinct; stigma 2-cleft.* (S. rosmarinifòlia, and S. fuscàta, *Pursh?*) — Same situations as the last, which this shrub resembles in some respects; but the mature leaves are not silky beneath, and dry less black: the scales are not so dark, and are clothed with longer white hair. Sterile catkins like the last; but the fertile shorter and broader, the pods (at length merely downy) spreading and showing the stalks.

* * * *Ovary sessile, woolly or silky: catkins bracted at the base: leaves not drying black. — Small trees.*

+ *Filaments united to the top, appearing like a single stamen.*

8. **S.** PURPÙREA, L. (PURPLE WILLOW.) *Leaves oblanceolate,* pointed, the lower somewhat opposite, *smooth,* minutely and sparingly toothed; catkins cylindrical; *scales round and concave, very black;* stigmas nearly sessile. (S. Lambertiàna, *Pursh.*) — Low grounds. Recognized at once in the sterile plant by the united filaments giving to the flowers a monandrous appearance. The twigs are polished, and of an ashy-olive color. (Adv. from Eu.)

+ + *Filaments separate.*

9. **S.** VIMINÀLIS, L. (BASKET OSIER.) *Leaves linear-lanceolate, very long and taper-pointed,* entire or obscurely crenate, *white and satiny beneath;* catkins cylindrical-ovoid, clothed with long silky hair; *ovary long and narrow; styles elongated; stigmas linear, mostly entire.* — Wet meadows. — Considered the best species for basket-work. Leaves 3′–6′ long, of a beautiful lustre beneath. — S. Smithiàna, *Willd.*, another species of this section, differing principally in the somewhat broader leaves, has also been introduced, and is occasionally met with. (Adv. from Eu.)

§ 2. *Catkins lateral, with 4–5 leafy bracts at the base, appearing with or before the leaves in May or June: inner membrane of the scales of the flowering buds separating from the cartilaginous exterior, sometimes elevated on the apex of the bursting catkins: ovary stalked, smooth (under a lens minutely granular, with occasionally a few short hairs at the base): stamens 2: scales dark or black, hairy, persistent.*

10. **S. cordàta,** Muhl. (HEART-LEAVED WILLOW.) *Leaves* lanceolate or ovate-lanceolate, *truncate or heart-shaped at base,* taper-pointed, *sharply toothed,* smooth, paler beneath; *stipules* kidney-shaped or ovate, toothed, *often large and conspicuous,* of the length of the (when young downy) petiole, or sometimes small and almost entire; *catkins appearing with the leaves, leafy at base,* cylindrical, the fertile elongating in fruit; ovary lanceolate, tapering to the summit. — Var. RÍGIDA has the leaves large and rigid, with coarser teeth, of which the lowest are somewhat elongated. (S. rigida, *Muhl.* S. Torreyàna, *Barratt,* which has leaves of a deeper green beneath, appears to belong here.) — Var. MYRICOÌDES has narrower leaves, neither heart-shaped nor truncate at the base,

(S. myricoides, *Muhl.*) — Inundated banks of rivers and low meadows; common. — Shrub 2° - 6° high: the first var. larger, or a small tree 6° - 15° high, with leaves 4′ - 6′ long. Fruiting catkins 2′ - 3′ in length.

11. **S. angustàta,** Pursh. (NARROW-LEAVED WILLOW.) *Leaves* lanceolate, acute, *long and tapering to the base, slightly toothed,* smooth and scarcely glaucous beneath; stipules half-heart-shaped; *catkins large, appearing before the leaves; ovary tapering into a long style.* — New York to Wisconsin and southwestward. — Catkins resembling those of No. 4 in size and aspect; but the ovaries are *quite smooth* and *very white.*

§ 3. *Catkins lateral, with a few leafy bracts at the base, appearing with the leaves in May or June: ovary stalked, silky: stamens 2: scales persistent.*

12. **S. rostràta,** Richardson. (LONG-BEAKED WILLOW.) *Leaves oblong* or obovate-lanceolate, acute, obscurely toothed, downy above, *prominently veined, softly hairy and glaucous beneath;* stipules semilunar, toothed; catkins cylindrical, the fertile becoming lóose in fruit; *pods tapering into a long beak, on stalks longer than the yellow lanceolate scales.* — Borders of woods and meadows, New England to Penn., Wisconsin, and northward. — A shrub or small tree, 4° - 15° high, with soft velvety leaves, somewhat variable in form. A transformation of the anthers into imperfect ovaries is frequently observable in this species, and occasionally in some others.

13. **S. phylicifòlia,** L. (SMOOTH MOUNTAIN-WILLOW.) *Leaves lanceolate* or ovate-lanceolate, somewhat pointed, or obtuse at each end, remotely and minutely repand-toothed, *smooth and shining above, glaucous beneath;* fertile catkins ovoid; ovary ovoid-conic, very short-stalked; *style elongated; stalk of the mature pods about twice the length of the gland; scales black,* sparingly clothed with long white hairs. — Moist ravines, on the alpine summits of the White Mountains, New Hampshire, *Oakes, Tuckerman,* &c. — A low spreading shrub, with leaves of a coriaceous texture when old. (Eu.)

§ 4. *Catkins peduncled (long and loose), borne on the summit of lateral leafy branches of the season, appearing in May and June: scales greenish-yellow, more or less hairy, falling before the pods are ripe: filaments slightly united, hairy below. — Shrubs and trees, with the branches very brittle at the base.*

* *Ovary sessile, smooth: stamens 2.*

14. **S.** ALBA, L. (WHITE WILLOW.) *Leaves* lanceolate or elliptic-lanceolate, pointed, toothed, *clothed more or less with white and silky hairs, especially beneath;* stipules lanceolate; *stigmas nearly sessile, thick and recurved.* — Var. VITELLÌNA has yellow or light red branches; leaves shorter and broader. (S. vitellina, *Smith & Borrer.* S. Pamcachiàna, *Barratt.*) — Var. CÆRÙLEA has the leaves nearly smooth at maturity, and greatly resembles the next species. (S. cærulea, *Smith.*) — A familiar tree, of rapid growth, attaining a height of 50° - 80°. (Adv. from Eu.)

* * *Ovary stalked, smooth: stamens 2 - 6.*

15. **S.** FRÁGILIS, L. (BRITTLE WILLOW.) *Leaves lanceolate, taper-pointed, smooth, glaucous beneath* (slightly silky when young), serrate with inflexed teeth; stipules half-heart-shaped; stamens commonly 2. — Var. DECÍPIENS has dark

crown buds, and the lowest leaves on the branches broadly obovate, very obtuse. (S. decipiens, *Hoffm.*) — Var. RUSSELLIÀNA has the leaves long and bright, strongly serrate; the younger ones, and upper branches of the annual shoots, silky-downy towards autumn; stipules large and taper-pointed. (S. Russelliana, *Smith.*) — A tall and handsome tree, with smooth polished branches; cultivated for basket-work. (Adv. from Eu.)

16. **S. nìgra,** Marshall. (BLACK WILLOW.) *Leaves narrowly lanceolate,* pointed and tapering at each end, serrate, *smooth* (except on the petioles and midrib) *and green on both sides;* stipules small, deciduous; *glands of the sterile flowers* 2, *large* and deeply 2–3 cleft; stamens 4–6, often but 3 in the upper scales. (S. ambigua, *Pursh.*) — Var. FALCÀTA has the *leaves elongated, scythe-shaped,* and the stipules large, broadly lunar, reflexed. (S. falcata, *Pursh.* S. Purshiàna, *Spreng.* S. ligustrina, *Michx. f.*) — Tree 15°–25° high, with a rough black bark; frequent on the margins of streams, especially southward.

17. **S. lùcida,** Muhl. (SHINING WILLOW.) *Leaves ovate-oblong or lanceolate and narrow with a long tapering point, smooth and shining on both sides,* serrate; stipules oblong, toothed; stamens commonly 5. — Overflowed banks of streams; rather common. — A beautiful species, sometimes flowering at the height of 3°, sometimes becoming a small bushy tree of 12°–15°.

S. BABYLÓNICA, Tourn. (WEEPING WILLOW), belongs to this section, and is much cultivated for ornament. Only the fertile plant is known in the United States. — There is also a remarkable variety of it with curled or annular leaves (S. annulàris, *Forbes*), known in gardens as the RING-LEAVED or HOOP WILLOW.

* * * *Ovary stalked, hairy: stamens 2.*

18. **S. longifòlia,** Muhl. (LONG-LEAVED WILLOW.) *Leaves linear-lanceolate, very long,* tapering at each end, *nearly sessile, remotely denticulate with projecting teeth,* clothed with gray hairs when young, at length nearly smooth; stipules small, lanceolate, toothed; *scaly hairs at the base* often glandular-toothed at the top in the sterile catkins; *gland long,* in the sterile flowers sometimes deeply 2–3-cleft; in the fertile longer than the *short stalk of the ovary; stigmas very large, sessile.* — New England and Penn. to Kentucky and northward. — Varying in height from 2°–12°; the stems and branches often prostrate, rooting extensively in sandy river-banks.

§ 5. *Catkins peduncled, borne on the lateral (or sometimes the terminal) leafy branches of the season, appearing in June: stipules deciduous or none: scales persistent. — Small shrubs, with underground spreading stems, sending up short erect or prostrate branches.*

19. **S. pedicellàris,** Pursh. (STALK-FRUITED WILLOW.) *Leaves* elliptic-obovate, obtuse or somewhat pointed, entire, smooth on both sides, *reticulately veined* and rather glaucous beneath; fertile catkins loose and few-flowered; *ovary smooth, on a stalk twice the length of the nearly smooth greenish-yellow scale; stamens* 2. — Cold swamps, New England to Wisconsin and northward. — An upright shrub, 1°–3° high, with leaves 1′–1½′ long, somewhat coriaceous when mature. Catkins ½′ long: pods reddish-green, veined with purple.

20. **S. Uva-Úrsi,** Pursh. (BEARBERRY WILLOW.) *Leaves* elliptical and pointed, or obovate and obtuse, tapering at the base, slightly toothed, *strongly veined, smooth and shining above,* rather glaucous beneath; catkins mostly lateral, oblong-cylindrical; *ovary smooth,* stalked; style distinct; *stamen single; scales oblanceolate, entire, black, covered with long silky hairs.* (S. Cutlèri, *Tuckerman.*) — Alpine summits of the White Mountains, New Hampshire, and Adirondack Mountains, New York. — A very small, almost prostrate shrub, known at once by the monandrous flowers. (S. retusa, *L.*, with which this species has been confounded, is a plant of the Southern Alps, having the catkins issuing from the *terminal* buds, with *smooth, notched scales, and two stamens.*)

21. **S. rèpens,** L. (CREEPING WILLOW.) *Leaves* lanceolate, pointed, when young obovate and obtuse, irregularly repand-toothed, smooth and green above, *covered beneath when young with long and shining deciduous hairs,* at maturity smooth and glaucous; catkins ovoid, short; *ovary densely silky,* stalked; style very distinct; *stamens* 2-3; gland sometimes double; scales obovate, obtuse, clothed with long hairs. (S. fúsca, *Smith.*) — Moist alpine ravines of the White Mountains, New Hampshire, and high northward. — Whole plant, when young, of a glossy, satiny lustre; the leaves at length becoming quite smooth, with a white and prominent midrib, and slightly elevated veins. (Eu.)

22. **S. herbàcea,** L. (HERB-LIKE WILLOW.) *Leaves roundish-oval, heart-shaped, notched at the apex,* serrate, smooth and shining, with reticulated veins; *catkins issuing from the terminal buds,* small and few-flowered; *ovary sessile, smooth;* scales smooth, ciliate. — Alpine summits of the White Mountains of New Hampshire. and high northward. — A very small herb-like species, the stems seldom rising above an inch or two from the ground. (Eu.)

2. PÓPULUS, Tourn. POPLAR. ASPEN.

Bracts (*scales*) of the catkins irregularly cut-lobed at the apex. Flowers from a cup-shaped disk which is obliquely lengthened in front. Stamens 8-30, or more: filaments distinct. Stigmas elongated. — Trees, with usually broad and more or less heart-shaped or ovate-toothed leaves, and mostly angular branches. Buds invested with imbricated scales, covered with resinous varnish. Aments long and drooping, appearing before the leaves. (The ancient name, called *Arbor Populi,* because it was used to decorate the public walks, or on account of the constant agitation of the leaves by every impulse.)

1. **P. tremuloides,** Michx. (AMERICAN ASPEN.) *Leaves roundish-heart-shaped,* with a short sharp point, and *small somewhat regular teeth,* smooth on both sides, with downy margins; *scales cut into 3-4 deep linear divisions,* fringed with long hairs. — Woods; common. — Tree 20°-50° high, with smooth greenish-white bark. Stalk of the leaf long, slender, and laterally compressed, which accounts for the continual agitation of the foliage by the slightest breeze.

2. **P. grandidentàta,** Michx. (LARGE-TOOTHED ASPEN.) *Leaves roundish-ovate, with large and irregular sinuate teeth,* when young densely covered with white silky wool, at length smooth both sides; *scales cut into 5-6 unequal small divisions,* slightly fringed. — Woods, New England to Penn., Wisconsin, and northward. — A rather larger tree than the last, with a smoothish gray bark.

3. **P. heterophýlla,** L. (Downy-leaved Poplar.) *Branches round, leaves heart-shaped or roundish-ovate, obtuse,* serrate, *white-woolly when young,* at length nearly smooth, except on the elevated veins beneath. — Swamps, W. New England to Illinois and southward. — Tree 40° - 60° high, with large, usually quite blunt leaves; the sinus, when heart-shaped, closed by the overlapping lobes which conceal the insertion of the nearly round leaf-stalk.

4. **P. monilífera,** Ait. (Cotton-wood. Necklace Poplar.) Young *branches slightly angled, becoming round; leaves broadly deltoid, with spreading prominent nerves, slightly heart-shaped or truncate at the base,* taper-pointed, serrate with cartilaginous and incurved slightly hairy teeth; fertile catkins very long; *scales lacerate-fringed, not hairy;* stigmas nearly sessile, toothed, dilated and very large. — Margins of lakes and streams, New England to Illinois and southward, especially westward. — A large tree, 80° high or upwards; the vigorous branches decidedly angled, bearing large leaves; the more stunted being round, with smaller foliage. (P. Canadénsis, *Michx. f.* P. lævigàta, *Willd.*)

5. **P. angulàta,** Ait. (Angled Cotton-wood.) *Branches acutely angular or winged; leaves broadly deltoid or heart-ovate,* smooth, crenate-serrate, or with obtuse cartilaginous teeth. — Low grounds, Pennsylvania to Wisconsin and southward. — Tree large as the last, and like it bearing very large and heart-shaped leaves (7′ - 8′ in length and breadth) on young plants and suckers: on full-grown trees only one fourth of that size, and commonly without the sinus.

6. **P. balsamífera,** L. (Balsam Poplar. Tacamahac.) *Branches round; leaves ovate, gradually tapering and pointed,* finely serrate, smooth on both sides, whitish and reticulately veined beneath; *scales dilated, slightly hairy;* stamens very numerous. — N. New England to Wisconsin, and northward. — A tall tree, growing on the borders of rivers and swamps: its large buds varnished with a fragrant resinous matter.

Var. **cándicans.** (Balm of Gilead.) *Leaves broader and more or less heart-shaped,* pointed, serrate, whitish and reticulate-veined beneath; petiole commonly hairy. (P. candicans, *Ait.*) — N. New England to Wisconsin and Kentucky: rare in a wild state, but common in cultivation.

P. nìgra, L., was admitted by the elder Michaux into his Flora, without any mention of its locality. It was afterwards published by his son, under the name of *P. Hudsónica:* he, however, found it "only on the banks of the Hudson River, above Albany." Lastly, it was described as *P. betulifòlia* by Pursh, who further added as its station, "about Lake Ontario." The tree was probably an introduced form of the European P. nigra, and was latterly so considered by the younger Michaux himself. A few of these trees are still found in the neighborhood of Hoboken, New Jersey.

P. dilatàta, Ait., the well-known pyramidal Lombardy Poplar, has been extensively introduced as an ornamental tree, and is found in the vicinity of all old settlements.

P. álba, L., the Abele or White Poplar of the Old World, is occasionally planted, when it spreads widely by the root, and becomes more common than is desirable.

Subclass II. GYMNOSPÉRMÆ.

Pistil represented by an open scale or leaf, or entirely wanting; the ovules and seeds therefore naked (without a pericarp), and fertilized by the direct application of the pollen. Cotyledons often more than two.

ORDER 111. CONÍFERÆ. (PINE FAMILY.)

Trees or shrubs, with resinous juice, mostly with awl-shaped or needle-shaped entire leaves, and monœcious or diœcious flowers in catkins, destitute of calyx or corolla. Ovules orthotropous. Embryo in the axis of the albumen, nearly its length. (Wood destitute of ducts, composed chiefly of a homogeneous large woody fibre which is marked with circular disks on two sides.) An important and rather large Order; comprising the three following Suborders: —

SUBORDER I. ABIETINEÆ. THE PROPER PINE FAMILY.

Fertile flowers in catkins, consisting of open imbricated carpels in the form of scales in the axil of a bract; in fruit forming a *strobile* or *cone*. Ovules 2, adherent to the base of each carpellary scale, their orifice turned downward. Buds scaly.

1. **PINUS.** Leaves 2-5 in a cluster from the axil of a scale-like primary leaf, persistent.
2. **ABIES.** Leaves all scattered on the branches and alike, persistent
3. **LARIX.** Leaves many in a cluster, the primary ones similar, deciduous.

SUBORDER II. CUPRESSINEÆ. THE CYPRESS FAMILY.

Fertile flowers consisting of few carpellary scales, without bracts, bearing single or several erect ovules on their base (the orifice upward), forming a closed strobile or a sort of drupe in fruit. Buds naked.

* Flowers monœcious. Strobile dry, opening at maturity.

4. **THUJA.** Fruit of few imbricated oblong scales. Ovules 2 Leaves scale-like, closely imbricated on the flattened branches.
5. **CUPRESSUS.** Fruit of several shield-form thickened scales united in a globular woody cone. Seeds 2 or more on the stalk of each scale. Leaves scale-like or awl-shaped.
6. **TAXODIUM.** Fruit of several thickened and rather shield-shaped scales united in a globular woody cone. Seeds 2 on the base of each scale. Leaves linear, 2-ranked, deciduous.

* * Flowers chiefly diœcious. Fruit berry-like, not opening.

7. **JUNIPERUS.** Fruit composed of 3-6 coalescent 1-3-ovuled scales, becoming fleshy.

SUBORDER III. TAXINEÆ. THE YEW FAMILY.

Fertile flower solitary, consisting of a naked ovule, ripening into a nut-like or drupe-like seed. Ovary entirely wanting. Buds scaly.

8. **TAXUS.** Ovule erect, encircled at the base by an annular disk, which forms a berry-like cup around the nut-like seed.

SUBORDER I. ABIETÍNEÆ. THE PROPER PINE FAMILY.

1. PÌNUS, Tourn. PINE.

Flowers monœcious. Sterile catkins spiked, consisting of numerous stamens inserted on the axis, with very short filaments and a scale-like connective: anther-cells 2, opening lengthwise. Pollen of 3 united grains. Fertile catkins terminal, solitary or aggregated, consisting of imbricated carpellary scales, each in the axil of a deciduous bract, bearing a pair of inverted ovules at the base. Fruit a cone formed of the imbricated and woody carpellary scales, which are thickened at the apex (except in White Pines), persistent, spreading when ripe and dry; the 2 nut-like seeds partly sunk in excavations at the base of the scale, and in separating carrying away a part of its lining in the form of a thin and fragile wing. Cotyledons 3-12, linear. — Primary leaves of the shoots thin and chaff-like, merely bud-scales; from their axils immediately proceed the secondary leaves, which make the foliage, in the form of fascicles of 2 to 5 needle-shaped evergreen leaves, from slender buds, the thin scarious bud-scales sheathing the base of the cluster. Blossoms developed in spring; the cones commonly maturing in the autumn of the second year. (The classical Latin name.)

§ 1. *Leaves 2 or 3 (very rarely 4) in a sheath, mostly rigid: bark rough: scales of the cones woody, thickened at the end and mostly spiny-tipped.*

* *Leaves in twos, in No. 5 occasionally some in threes.*

1. **P. Banksiàna,** Lambert. (GRAY or NORTHERN SCRUB PINE.) *Leaves short* (1′ long), *oblique, divergent;* cones ovate-conical, usually curved, smooth, the *scales pointless.* (P. rupestris, *Michx. f.*) — Rocky banks, N. Maine, N. Michigan and Wisconsin, and northward. — A straggling shrub or low tree (5°-20° high); the rigid leaves concave-grooved above; the irregular or curved cones 1½′-2′ long.

2. **P. ínops,** Ait. (JERSEY or SCRUB PINE.) *Leaves rather short* (1¾′-2¾′ long); cones oblong-conical, sometimes curved (2′-3′ long), the *scales tipped with a prominent and straight awl-shaped prickle.* — Barrens and sterile hills, New Jersey to Kentucky and southward. A straggling tree, 15°-40° high, with spreading or drooping branchlets: young shoots with a purplish glaucous bloom.

3. **P. púngens,** Michx. (TABLE MOUNTAIN PINE.) *Leaves stout and rigid,* rather short (2½′ long), crowded; cones ovate (3½′ long), the *scales armed with a strong hooked spine* (¼′ long). — Blue Ridge, Virginia, west of Charlottesville (*Curtis*), and southward.

4. **P. resinòsa,** Ait. (RED PINE.) *Leaves from long sheaths, semicylindrical, elongated* (5′-6′ long), dark green; cones ovoid-conical; the *scales pointless.* (P. rubra, *Michx. f.*) — Dry woods, Maine to Penn., Wisconsin, and northward. — Tree 50°-80° high, with reddish and rather smooth bark, and compact wood, but usually less resinous than in No. 6. Cones about 2′ long, sometimes aggregated in large and close clusters. — Wrongly called *Norway Pine.*

5. **P. mìtis,** Michx. (YELLOW PINE.) *Leaves* in pairs or sometimes in threes *from long sheaths, channelled, slender* (3′-5′ long); cones ovoid or oblong-conical (barely 2′ long); the *scales tipped with a minute and weak prickle.* (P.

variábilis, *Pursh.*) — Dry or sandy soil, W. New England? and New Jersey to Wisconsin, and common southward. — Tree 50° - 60° high, straight, producing a durable, fine-grained, moderately resinous timber, valuable for flooring, &c. Leaves more soft and slender than in any of the preceding, dark green.

* * *Leaves in threes (very rarely some in fours).*

6. **P. rígida,** Miller. (PITCH PINE.) *Leaves rigid* (3′ - 5′ long) dark green, flattish, *from very short sheaths;* cones ovoid-conical or ovate (1′ - 3½′ long), often in clusters; the *scales tipped with a short and stout recurved prickle.* — Sandy or spare rocky soil, Maine to W. New York and southward; common. — Tree 30° - 70° high, with very rough and dark bark, and hard wood saturated with resin (a variety sometimes called *Yellow Pine* furnishes much less resinous timber). — P. serótina, *Michx.* is a form with ovate or almost globular cones.

7. **P. Tæ̀da,** L. (LOBLOLLY or OLD-FIELD PINE.) *Leaves long* (6′ - 10′), *rigid, with elongated sheaths,* light green; cones oblong (3′ - 5′ long); the *scales tipped with a short incurved spine.* — Barren light soil, Virginia and southward; common. — Tree 50° - 100° high.

§ 2. *Leaves 5 in a sheath, soft and slender: scales of the cones neither prickly-pointed nor thickened at the end: bark smooth.*

8. **P. Stròbus,** L. (WHITE PINE.) Leaves very slender, rather glaucous, the sheaths deciduous; cones narrow, cylindrical, nodding, a little curved (4′ - 6′ long). — Cool and damp woods; common northward, extending southward in the Alleghanies, but rare in those of Virginia. — The White Pine (called in England *Weymouth Pine*) is our tallest tree, often 120° - 160° in a single straight column in primitive forests, and is invaluable for its soft and light white or yellowish wood, which in large trunks is nearly free from resin.

2. ÀBIES, Tourn. SPRUCE. FIR.

Sterile catkins scattered or somewhat clustered towards the end of the branchlets. Scales of the strobiles thin and flat, not at all thickened at the apex, nor with a prickly point. Seeds with a persistent wing. — Leaves all foliaceous and scattered, short, frequently 2-ranked. Otherwise nearly as in Pinus. (The classical Latin name.)

§ 1. *Cones erect, lateral; the scales and the more or less projecting bracts falling from the axis at maturity: sterile catkins clustered: anther-cells opening by a transverse laceration: leaves flat, becoming 2-ranked, whitened underneath, obtuse or notched at the apex.* (ABIES, *Pliny, &c.* Picea, *L., Don, Loudon,* not of *Link.*)

1. **A. balsàmea,** Marshall. (BALSAM FIR.) Leaves narrowly linear; *cones cylindrical, large,* violet-colored; *the bracts obovate,* serrulate, tipped with an abrupt slender point, *slightly projecting, appressed.* — Cold damp woods and swamps, New England to Penn., Wisconsin, and northward. — A slender tree, of little value as timber, when young very handsome, but short-lived. Leaves 1′ or less in length, narrower and lighter green above than those of the European *Silver Fir;* the cones 3′ - 4′ long, 1′ broad, the scales very broad and rounded. Also called *Canada Balsam* or *Balm-of-Gilead Fir.* The well-known *Canada balsam* is drawn from blisters in the bark of this and the next species.

2. **A. Fràseri,** Pursh. (Small-fruited or Double Balsam Fir.) *Cones small* (1'–2' long), *oblong-ovate; the bracts oblong-wedge-shaped,* short-pointed, the upper part *much projecting and reflexed.* (A. balsamífera, *Michx. fl.*) — Mountains of Penn., Virginia, and southward on the highest Alleghanies. Also on the mountains of W. New England? — Foliage, &c. nearly as in the last.

§ 2. *Cones hanging, terminal; the bracts evanescent; the scales persistent on the axis: sterile catkins scattered: anther-cells opening lengthwise.* (Pìcea, *Link, &c.*)

* *Leaves 2-ranked, flat, whitened underneath.*

3. **A. Canadénsis,** Michx. (Hemlock Spruce.) Leaves linear, flat, obtuse (½' long); cones oval, of few scales, little longer than the leaves (¾' long). — Hilly or rocky woods; very common northward, and rare southward in the Alleghanies. — A large tree, when young the most graceful of Spruces, with a light, spreading spray, and delicate foliage, bright green above, silvery underneath. Timber very coarse-grained and poor.

* * *Leaves needle-shaped, 4-angular, equally distributed all around the branch.*

4. **A. nìgra,** Poir. (Black Spruce. Double Spruce.) Leaves short (½'–¾' long), rigid, dark green; *cones ovate or ovate-oblong* (1'–1½' long); the *scales with a thin and wavy or eroded edge.* — Swamps and cold mountain woods, New England to Wisconsin and northward, and southward along the mountains. — A common variety in New England has lighter-colored or glaucous-green leaves, rather more slender and loosely spreading, and is undistinguishable from the next, except by the cones.

5. **A. álba,** Michx. (White or Single Spruce.) *Cones oblong-cylindrical* (1'–2' long), the *scales with firm and entire edges:* otherwise as in the lighter-colored variety of the last. — In similar situations, but only northward. Probably these two, with the Red Spruce, are mere forms of one species.

A. excélsa, the Norway Spruce, is now much planted: it is a much finer tree, and thrives better than our indigenous species of this group.

3. LÀRIX, Tourn. Larch.

Catkins lateral and scattered, bud-like. Sterile flowers nearly as in Pinus, but the pollen of simple spherical grains. Cones ovoid, erect; the bracts and scales persistent; otherwise as in Abies. — Leaves deciduous, soft, all foliaceous; the primary ones scattered; the secondary very many in a fascicle developed in early spring from lateral scaly and globular buds. Fertile catkins crimson or red in flower. (The ancient name.)

1. **L. Americàna,** Michx. (American or Black Larch. Tamarack. Hackmatack.) Leaves almost thread-form; cones ovoid, of few rounded scales. (P. pendula, *Ait.*) — Swamps, New England to Penn. and Wisconsin, and (chiefly) northward. — A slender tree, with heavy, close-grained wood, and slender horizontal branches, more slender and usually shorter leaves than the *European Larch;* — which is a handsomer tree, and has the scales of its larger cones arranged in the order $\frac{8}{21}$, while those of the American are only $\frac{3}{8}$. — The Red Larch (P. microcárpa, *Lambert*) appears to be only a Northern variety.

SUBORDER II. CUPRESSÍNEÆ. THE CYPRESS FAMILY

4. THÙJA, Tourn. ARBOR VITÆ.

Flowers monœcious on different branches, in very small terminal ovoid catkins. Stamens with a scale-like filament or connective, bearing 4 anther-cells. Fertile catkins of few imbricated scales, fixed by the base, each bearing 2 erect ovules, dry and spreading at maturity. Cotyledons 2. — Small evergreen trees, with very flat 2-ranked spray, on which the small and appressed persistent leaves are closely imbricated: these are of two sorts, on different or successive branchlets; the one awl-shaped; the other scale-like, blunt, short, and adnate. (Θυῖα, Θύα, or Θυεία, the ancient name of some resin-bearing evergreen.)

1. **T. occidentàlis**, L. (AMERICAN ARBOR VITÆ.) Leaves appressed-imbricated in 4 rows on the 2-edged branchlets; scales of the cones pointless; seeds broadly winged all round. — Swamps and cool rocky banks, N. New England to Penn. and Wisconsin; chiefly northward, where it forms extensive "cedar-swamps," and is called WHITE CEDAR: rare southward along the Alleghanies. — Tree 20° - 50° high, straight, with recurved branches, yielding a pungent aromatic oil: wood light, but exceedingly durable.

5. CUPRÉSSUS, Tourn. CYPRESS.

Flowers monœcious on different branches, in terminal small catkins. Sterile catkins composed of shield-shaped scale-like filaments bearing 2 - 4 anther-cells under the lower margin. Fertile catkins globular, of shield-shaped scales in 4 ranks, bearing several erect bottle-shaped ovules. Cone globular, firmly closed, but opening at maturity; the scales thick and woody, pointed or bossed in the middle; the few or several narrowly-winged seeds attached to their contracted base or stalk. Cotyledons 2 or 3. — Strong-scented evergreen trees, with very small and scale-like closely appressed-imbricated leaves, and exceedingly durable wood. (The classical name.)

1. **C. thyoìdes**, L. (WHITE CEDAR.) Leaves minute, ovate, with a small gland on the back, closely imbricated in 4 rows on the 2-edged branchlets; anther-cells 2 under each scale. — Swamps, E. Massachusetts to Ohio, Virginia, and southward. May. — Tree 30° - 70° high; the wood and fibrous shreddy bark, as well as the foliage, much like the Arbor Vitæ; but the spray more slender, the leaves finer and dull glaucous-green. Cone scarcely larger than a pea, few-seeded.

6. TAXÒDIUM, Richard BALD CYPRESS.

Flowers monœcious on the same branches. Sterile catkins spiked-panicled, of few stamens: filaments scale-like, shield-shaped, bearing 2 - 5 anther-cells. Fertile catkins ovoid, in small clusters, scaly, with 2 ovules at the base of each scale. Cone globular, closed, composed of very thick and angular somewhat shield-shaped scales, bearing 2 angled seeds at their base. Cotyledons 6 - 9. — Trees with linear 2-ranked light and deciduous leaves. (Name compounded of Τάξος, *the Yew*, and εἶδος, *resemblance*.)

1. **T. distichum,** Richard. (AMERICAN BALD CYPRESS.) Leaves linear and spreading; also awl-shaped and imbricated on flowering branchlets. — Swamps, from S. New Jersey? and Delaware, to Virginia, Kentucky, and southward, where it is a very large and valuable tree. March, April.

7. JUNÍPERUS, L. JUNIPER.

Flowers diœcious, or occasionally monœcious, in very small lateral catkins. Anther-cells 3 – 6, attached to the lower edge of the shield-shaped scale. Fertile catkins ovoid, of 3 – 6 fleshy 1 – 3-ovuled coalescent scales; in fruit forming a sort of berry, scaly-bracted underneath. Seeds 1 – 3, bony. Cotyledons 2. — Evergreen trees or shrubs, with awl-shaped or scale-like rigid leaves often of two shapes. (The classical name.)

1. **J. commùnis,** L. (COMMON JUNIPER.) Leaves in threes, linear-awl-shaped, prickly-pointed, spreading, bright green except the glaucous-white upper surface. — Dry sterile hills, New Jersey to Maine eastward, northward, and along the Great Lakes. May. — Shrub also spreading on the ground, or rarely ascending, rigid. Berries dark purple, as large as a pea. (Eu.)

2. **J. Virginiàna,** L. (RED CEDAR. SAVIN.) Leaves 4-ranked, much crowded, on young plants and primary or rapidly-growing shoots awl-shaped and somewhat spreading, in pairs or threes; on older lateral twigs very small and scale-like, closely imbricated, triangular-ovate. — A branching shrub or small tree, becoming 15° – 30° high; or, var. HÙMILIS, *Hook.*, a widely spreading or almost prostrate shrub. — Dry, rocky or sterile hills; common, extending both northward and southward: the prostrate variety chiefly high northern. April. — Wood odorous, reddish, very compact and durable. Berries small, purplish with a glaucous bloom.

SUBORDER III. TAXÍNEÆ. THE YEW FAMILY.

8. TÁXUS, Tourn. YEW.

Flowers mostly diœcious, axillary from scaly buds; the sterile in small globular catkins formed of naked stamens: anther-cells 3 – 8 under a shield-like somewhat lobed connective. Fertile flowers solitary, scaly-bracted at the base, consisting merely of an erect sessile ovule, with a cup-shaped disk around its base, which becomes pulpy and berry-like (globular and red) in fruit, and partly encloses the nut-like seed. Cotyledons 2. — Leaves evergreen, flat, mucronate, rigid, scattered, 2-ranked. (The classical name, probably from τόξον, *a bow;* the wood being used for bows.)

1. **T. baccàta,** L., var. **Canadénsis.** (AMERICAN YEW. GROUND HEMLOCK.) Stems diffusely spreading; leaves linear, green both sides. (T. Canadensis, *Willd.*) — Moist banks and hills, near streams, especially in the shade of evergreens: common northward, extending southward only along the Alleghanies. April. — Our Yew is a low and straggling or prostrate bush, never forming an ascending trunk. (Eu.)

CLASS II. MONOCOTYLÉDONOUS OR ENDÓGENOUS PLANTS.

Stems with no manifest distinction into bark, wood, and pith; but the woody fibre and vessels collected into bundles or threads which are irregularly imbedded in the cellular tissue: perennial trunks destitute of annual layers. Leaves mostly parallel-veined (nerved) and sheathing at the base, seldom separating by an articulation, almost always alternate or scattered and not toothed. Parts of the flower commonly in threes. Embryo with a single cotyledon (and the leaves of the plumule alternate).

ORDER 112. ARÀCEÆ. (ARUM FAMILY.)

Plants with acrid or pungent juice, simple or compound often veiny leaves, and monœcious or perfect flowers crowded on a spadix, which is usually surrounded by a spathe. — Floral envelopes none, or of 4 – 6 sepals. Fruit usually a berry. Seeds with fleshy albumen, or none but filled with the large fleshy embryo in Nos. 2, 4, and 5. (A large family, chiefly tropical.)

Synopsis.

* Spadix surrounded by a spathe.

+ Flowers naked, i. e destitute of any floral envelopes.

1. **ARISÆMA.** Flowers monœcious or diœcious, covering only the base of the spadix. Spathe convolute below.
2. **PELTANDRA.** Flowers monœcious, covering the whole surface of the spadix; the anthers above, the ovaries below.
3. **CALLA.** Flowers perfect (at least the lower ones), covering the whole surface of the short spadix. Spathe open and spreading.

+ + Flowers with a regular calyx.

4. **SYMPLOCARPUS.** Flowers perfect, covering the whole of the oval spadix, each with a calyx of 4 hooded sepals, all combined into one mass in fruit.

* * Spadix naked (not surrounded by any spathe) Flowers perfect and with a calyx.

5. **ORONTIUM.** Spadix terminating a naked scape Stamens 4 – 6: anthers 2-celled.
6. **ACORUS.** Spadix bursting from the side of a leaf-like scape. Stamens 6: anthers 1-celled.

1. ARISÆMA, Martius. INDIAN TURNIP. DRAGON-ARUM.

Spathe convolute below and mostly arched above. Flowers by abortion diœcious, or monœcious, covering the base of the spadix, which is elongated and naked above. Floral envelopes none. Sterile flowers above the fertile, consisting of whorls of 4 or more stamens, with very short filaments and 2 – 4-celled anthers, opening by pores or chinks at the top. Fertile flowers consisting each of a 1-celled ovary tipped with a depressed stigma, and containing 5 or 6 orthotropous ovules erect from the base of the cell; in fruit a 1 - few-seeded scarlet berry. Embryo in the axis of albumen. — Low perennial herbs, with a tuberous rootstock or corm, sending up a simple scape sheathed with the petioles of the simple or compound veiny leaves, as if caulescent. (A play upon *Arum*, the ancient name; probably formed of *ἄρον*, *Arum*, and *σῆμα*, *a sign or mark.*)

1. **A. triphýllum,** Torr. (Indian Turnip.) *Leaves mostly* 2, *divided into* 3 *elliptical-ovate pointed leaflets; spadix often diœcious, club-shaped,* obtuse, much shorter than the spathe, which is flattened and incurved-hooded at the summit. (Arum triphyllum, *L.*) — Rich woods; common. May. — Corm turnip-shaped, wrinkled, farinaceous, with an intensely acrid juice. Spathe with the petioles and sheaths green, or often variegated with dark purple and whitish stripes or spots (Arum atrorubens, *Ait.*); the limb ovate-lanceolate, pointed.

2. **A. Dracóntium,** Schott. (Green Dragon. Dragon-root.) *Leaf usually solitary, pedately divided* into 7 - 11 oblong-lanceolate pointed leaflets; *spadix androgynous, tapering to a long and slender point* beyond the oblong and convolute pointed spathe. (Arum Dracontium, *L.*) — Low grounds along streams. May. — Corms clustered. Petiole 1° - 2° long, much longer than the peduncle. Spathe greenish, rolled into a tube, with a short erect point.

2. PELTÁNDRA, Raf. Arrow Arum.

Spathe elongated, convolute throughout, wavy on the margin, curved at the apex. Flowers monœcious, thickly covering the long and tapering spadix throughout. Floral envelopes none. Anthers sessile, naked, covering all the upper part of the spadix, each of 5 or 6 cells imbedded in the margin of a thick and shield-shaped connective, opening by a terminal pore. Ovaries 1-celled at the base of the spadix, bearing several (orthotropous?) ovules at the base: stigma nearly sessile. Berries distinct, 1 - 3-seeded. Seed obovate, surrounded by a tenacious jelly, somewhat amphitropous, with the micropyle superior, the base empty, the upper part filled with a large and fleshy spherical embryo, the plumule superior, and no albumen. — A stemless herb, with arrow-shaped leaves and simple scapes from the root of thick tufted fibres. Upper part of the spathe and the sterile portion of the spadix rotting away after flowering, leaving the fleshy base firmly enclosing the globular cluster of green berries. (Name composed of *πέλτη*, *a target*, and *ἀνήρ*, for *stamen*, from the shape of the latter.)

1. **P. Virgínica,** Raf. (Arum Virginicum, *L.* Lecontia, *Torr.* Rensselæria, *Beck.*) — Swampy borders of ponds and streams; common. June. — Leaves large, pointed; nerves reticulated next the margin. (It seems to have escaped attention that this plant has an *exalbuminous corm-like embryo*, nearly as in Symplocarpus.)

3. CÁLLA, L. Water Arum.

Spathe open and spreading, ovate (abruptly pointed, the upper surface white), persistent. Spadix oblong, entirely covered with flowers; the lower perfect; the upper often of stamens only. Floral envelopes none. Filaments slender anthers 2-celled, opening lengthwise. Ovary 1-celled, with 5 – 6 erect anatropous ovules: stigma sessile. Berries (red) distinct, few-seeded. Seeds with a conspicuous rhaphe, and an embryo nearly the length of the hard albumen. — A low perennial herb, growing in cold bogs, with a creeping thickish rootstock, bearing heart-shaped long-petioled leaves, and solitary scapes. (An ancient name, of unknown meaning.)

1. **C. palústris,** L. — Cold bogs, New England to Penn., Wisconsin, and common northward. June. — Seeds surrounded with jelly. (Eu.)

4. SYMPLOCÁRPUS, Salisb. SKUNK CABBAGE.

Spathe hooded-shell-form, pointed, very thick and fleshy, decaying in fruit. Spadix globular, short-stalked, entirely covered with perfect flowers which are thickly crowded and their (1-celled or abortively 2-celled) ovaries immersed in the fleshy receptacle. Sepals 4, hooded. Stamens 4, opposite the sepals, with at length rather slender filaments: anthers extrorse, 2-celled, opening lengthwise. Style 4-angled: stigma minute. Ovule solitary, suspended, orthotropous. Fruit a globular or oval mass, composed of the enlarged and spongy spadix, enclosing the spherical seeds just beneath the surface, which is roughened with the persistent and fleshy sepals and pyramidal styles. Seeds filled by the large globular and fleshy corm-like embryo, which bears one or several plumules at the end next the base of the ovary: albumen none. — Perennial herbs, with a strong odor like that of the skunk, and also somewhat alliaceous; a thick descending rootstock bearing a multitude of long and coarse fibrous roots, and a cluster of very large and entire veiny leaves, preceded by the nearly sessile spathes. (Name from *συμπλοκή*, *connection*, and *καρπός*, *fruit*, in allusion to the coalescence of the ovaries, &c. into a compound fruit.)

1. **S. fœ́tidus,** Salisb. Leaves ovate, heart-shaped (1° – 2° long when grown), short-petioled; spadix much shorter than the spathe. (Ictòdes, *Bigel.*) — Moist grounds; common. March, April. — Spathe spotted and striped with purple and yellowish-green, ovate, incurved. Fruit ripe in September, forming a roughened globular mass 2′ – 3′ in diameter, in decay shedding the bulblet-like seeds, which are ⅓′ – ½′ in diameter, and filled with the singular solid fleshy embryo.

5. ORÓNTIUM, L. GOLDEN-CLUB.

Spathe none. Flowers crowded all over a cylindrical spadix, perfect: the lower with 6 concave sepals and 6 stamens; the upper ones with 4. Filaments flattened: anthers 2-celled, opening obliquely lengthwise. Ovary 1-celled, with 1 amphitropous ovule: stigma sessile, minute. Fruit a green utricle. Seed without albumen. Embryo thick and fleshy, "with a large concealed cavity at the summit, the plumule curved in a groove on the outside." (*Torr.*) — An aquatic perennial, with a deep rootstock, long-petioled and entire nerved floating leaves, and the spadix terminating the naked scape, which thickens upward. (Origin of the name obscure.)

1. **O. aquáticum,** L. — Ponds, Massachusetts to Virginia, near the coast, and southward. May.

6. ÁCORUS, L. SWEET FLAG. CALAMUS.

Spadix lateral, sessile, emerging from the side of a scape which resembles the leaves, densely covered with perfect flowers. Sepals 6, concave. Stamens 6: filaments linear: anthers kidney-shaped, 1-celled, opening across. Ovary 2–3-celled, with several pendulous orthotropous ovules in each cell: stigma minute. Fruit at length dry, gelatinous inside, 1–few-seeded. Embryo in the axis of albumen.—Pungent aromatic plants, especially the thick creeping rootstocks (*calamus* of the shops), which send up 2-edged sword-like leaves, and scapes similar to them, bearing the spadix on one edge; the upper and more foliaceous prolongation sometimes considered as an open spathe. (The ancient name, from *α* privative, and *κόρη*, *the pupil of the eye*, having been used as a remedy for sore eyes.)

1. **A. Cálamus,** L. Scape leaf-like and prolonged far beyond the cylindrical (yellowish-green) spadix.—Margin of rivulets, swamps, &c. June. —It appears to be truly indigenous northward. (Eu.)

ORDER 113. TYPHÀCEÆ. (CAT-TAIL FAMILY.)

Marsh herbs, with nerved and linear sessile leaves, and monœcious flowers on a spadix or in heads, destitute of proper floral envelopes. Ovary tapering into a slender style and usually an elongated 1-sided stigma. Fruit nut-like when ripe, 1-seeded. Seed suspended, anatropous: embryo straight in copious albumen.—Comprises only the two following genera.

1. TỲPHA, Tourn. CAT-TAIL FLAG.

Flowers in a long and very dense cylindrical spike terminating the stem; the upper part consisting of stamens only, intermixed with simple hairs, and inserted directly on the axis; the lower or fertile part consisting of ovaries, surrounded by club-shaped bristles, which form the copious down of the fruit. Nutlets minute, very long-stalked.—Spathes merely deciduous bracts, or none. Rootstocks creeping. Leaves long, sheathing the base of the simple jointless stems, erect, thickish. (Name from *τῖφος*, *a fen*, alluding to the place of growth.)

1. **T. latifòlia,** L. (COMMON CAT-TAIL or REED-MACE.) *Leaves nearly flat;* staminate and pistillate parts of the spike approximate or continuous.—Borders of ponds, &c. July. (Eu.)

2. **T. angustifòlia,** L. (NARROW-LEAVED or SMALL CAT-TAIL.) *Leaves channelled towards the base, narrowly linear;* staminate and pistillate parts of the spike usually separated by an interval.—In similar places with the last; a rarer and smaller plant; probably a mere variety of it. (Eu.)

2. SPARGÀNIUM, Tourn. BUR-REED.

Flowers collected in separate dense spherical heads, scattered along the summit of the stem, subtended by leaf-like bracts, the upper ones sterile, consisting merely of stamens, with minute scales irregularly interposed; the lower or fertile larger, consisting of numerous sessile pistils, each surrounded by 3 – 6 scales much like a calyx. Fruit nut-like when mature. — Roots fibrous. Stems simple or branching, sheathed below by the base of the linear leaves. (Name from σπάργανον, a *fillet*, from the ribbon-like leaves.)

* *Inflorescence mostly branched, with numerous heads, the* 1 – 3 *lower fertile, the rest sterile: stigmas often* 2, *linear, much longer than the style: stems stout, erect* (2° – 3° *high*): *leaves erect* (½′ – ¾′ *wide*), *flat and merely keeled, the base triangular with concave sides: fruit sessile.*

1. **S. eurycárpum,** n. sp. Engelm. *Fruit* many-angled (3½″ – 4″ long), *with a broad and depressed or retuse summit* (2½″ wide), *abruptly and slightly tipped* in the centre; head globose, 1′ wide when ripe. — Borders of ponds, &c., common northward and especially westward. June – Sept.

2. **S. ramòsum,** Hudson. *Fruit* somewhat triangular, *with the summit hemispherical and pointed,* smaller than in the last. — Same situations, northward and eastward. July – Sept. (Eu.)

* * *Inflorescence mostly simple: stigma single: stem slender.*

3. **S. símplex,** Hudson. Fertile and sterile heads each 3 or 4, the latter or some of them mostly peduncled (½′ – ¾′ broad); *fruit abruptly contracted at the summit into a slender beak* as long as itself; stigma linear; leaves triangular at the base with flat sides (6′ – 18′ long). (S. Americanum, *Nutt.*) — Along streams and pools; common northward and eastward. (Eu.)

4. **S. nàtans,** L., var. **affìne,** Fries. Heads few, the fertile 1 – 3; stigma short; *fruit oblong, slender-beaked* as in No. 3, also *attenuate into a stalk-like base; leaves very long and flaccid, floating.* (S. affine, *Schnitzlein.*) In ponds and slow streams, New England, New York, and northward. — This may be the S. angustifolium of Michaux, as is generally thought; but Fries assigns that to the next. (Eu.)

5. **S. angustifòlium,** Michx. Small and slender; *fruit more triangular, scarcely beaked, short-pointed,* not contracted at the base; leaves long and narrow (1½″ – 2″ wide) and floating when growing in water, scarcely surpassing the stems in dwarf states growing nearly out of water (5′ – 8′ high). — New England to Wisconsin and northward. — Fruiting heads only 2½″ – 3″ in diameter. (Eu.)

ORDER 114. LEMNÀCEÆ. (DUCKWEED FAMILY.)

Minute stemless plants, floating free on the water, destitute of distinct stem and foliage, being merely a flat frond, producing few monœcious flowers from a chink at the edge or upper surface, and usually hanging roots from underneath: ovules erect from the base of the cell. Fruit a 1 – 7*-seeded utricle. Embryo straight, in the axis of fleshy albumen.* — A little group of plants, of peculiar mode of growth, in character mostly intermediate between the Arum Family and the following, to one or the other of which it may be joined. — The Linnæan genus Lemna has been divided into three genera, (answering to the following sections,) possibly with sufficient reasons; but it is not worth while to adopt them here, since the flowers and fruit are rarely met with.

1. LÉMNA, L. Duckweed. Duck's-meat.

Flowers appearing from a cleft in the edge of the frond, three together bursting through a thin and membranous urn-shaped spathe; two of them consisting of single stamens (one developed rather earlier than the other), with thread-like filaments and 2-celled anthers; the other a 1-celled ovary forming a utricle in fruit: stigma funnel-form: ovules anatropous or half-anatropous. — Root with a sheath-like appendage on its extremity. Fronds laterally proliferous by a sort of budding, and producing little bulbets which sink to the bottom of the water in autumn but rise to develop on the surface in spring. (An old Greek name, of uncertain meaning.)

§ 1. LEMNA, Schleiden. — *Root single: filaments filiform: ovule solitary.*

1. **L. trisúlca,** L. *Fronds oblong-lanceolate from a stalked base, thin,* denticulate at the tip ($\frac{1}{2}'-\frac{3}{4}'$ long), proliferous from the side, so as to form crosses; "*ovule half anatropous.*" — Ponds; not rare: but the flowers little known. (Eu.)

2. **L. minor,** L. Fronds roundish-obovate, thickish (about 2″ long), often grouped; "*ovule half-anatropous; seed horizontal.*" — Very common, mantling stagnant waters: not yet found in flower in this country. (Eu.)

3. **L. perpusílla,** Torr. *Fronds obovate, thin* ($1''-1\frac{1}{2}''$ long), single or grouped; *ovule anatropous; seed erect,* striate. — Staten Island, New York (*Torrey*), and doubtless common elsewhere. August.

§ 2. SPIRÒDELA, Schleiden. — *Roots several in a cluster from each frond: filaments of the stamens narrowed below: ovules* 2.

4. **L. polyrrhìza,** L. Fronds roundish-obovate ($3''-4''$ long), thick, rather convex beneath. — Ponds and pools. Not here found in flower. (Eu.)

§ 3. TELMATÓPHACE, Schleiden. — *Roots single: filaments of the stamens enlarged in the middle: ovules and seeds* 2 – 7, *anatropous: albumen little.*

5. **L. gibba,** L. *Fronds obovate, nearly flat above, tumid and spongy underneath* (hemispherical), proliferous on short and very fragile stalks, therefore seldom found connected ($3''-4''$ long). — Ponds; rather rare. Not here seen in flower. (Eu.)

Order 115. NAIADÀCEÆ. (Pondweed Family.)

Immersed aquatic plants, with jointed stems and sheathing stipules within the petioles, or with sheathing bases to the leaves, inconspicuous mono-diœcious or perfect flowers, which are naked or with a free merely scale-like calyx; the ovaries solitary or 2 – 4 *and distinct,* 1-*celled,* 1-*ovuled.* Seed without albumen, filled by the large embryo, often curved or hooked. Flowers usually bursting from a spathe, sometimes on a spadix.

Synopsis.

* Flowers monœcious or diœcious, axillary, naked, monandrous.

1. NAIAS. Pistils solitary and naked: stigmas 2 – 4.
2. ZANNICHELLIA. Pistils about 4 from a cup-shaped involucre or sheath.

3. ZOSTERA. Pistils and anthers alternately sessile in 2 rows on one side of a linear spadix enclosed in a leaf. Stigmas 2.

*** * Flowers perfect.**

4. RUPPIA. Flowers naked on a spadix: each of 4 large anther-cells, and 4 ovaries which are raised on long stalks in fruit.

5. POTAMOGETON. Flowers and fruit spiked. Sepals, stamens, and sessile ovaries each 4.

1. NÀIAS, L. NAIAD.

Flowers diœcious (or sometimes monœcious), axillary, solitary and sessile; the sterile consisting of a single stamen enclosed in a little membranous spathe: anther at first nearly sessile, the filament at length elongated. Fertile flowers consisting of a single ovary tapering into a short style: stigmas 2–4, awl-shaped: ovule erect, anatropous. Fruit a little seed-like nutlet, enclosed in a loose and separable membranous epicarp. Embryo straight, the radicular end downwards. — Slender branching herbs, growing entirely under water, with opposite linear leaves, somewhat crowded into whorls, sessile and dilated at the base. Flowers very small, solitary, but often clustered with the branch-leaves in the axils. (Naïás, *water-nymph;* an ill-chosen name for these insignificant water-weeds; from their place of growth.)

1. **N. fléxilis,** Rostk. Leaves membranaceous, spreading, very narrowly linear, entire, or sparingly very minutely denticulate (under a lens); stigmas usually 3–4. (N. Canadénsis, *Michx.* Caulinia flexilis, *Willd.*) — Ponds and slow streams; common. July–Sept. (Eu.)

N. MÌNOR (Caulínia frágilis, *Willd.*), with the more rigid and recurved fragile leaves rather strongly toothed, is not identified in this country.

2. ZANNICHÉLLIA, Micheli. HORNED PONDWEED.

Flowers monœcious, sessile, naked, usually both kinds from the same axil: the sterile consisting of a single stamen, with a slender filament bearing a 2–4-celled anther; the fertile of 2–5 (usually 4) sessile pistils in the same cup-shaped involucre, forming obliquely oblong nutlets in fruit, beaked with a short style, which is tipped by an obliquely disk-shaped or somewhat 2-lobed stigma. Seed orthotropous, suspended, straight. Cotyledon taper, bent and coiled up. — Slender branching herbs, growing under water, with very slender stems, opposite or alternate long and linear thread-form entire leaves, and sheathing membranous stipules. (Named in honor of *Zannichelli,* a Venetian botanist.)

1. **Z. palústris,** L. Style at least half as long as the fruit, which is flattish, somewhat incurved, even, or occasionally more or less toothed on the back (not wing-margined in our plant), nearly sessile, or, in var. PEDUNCULÀTA, both the cluster and the separate fruits evidently peduncled. — Ponds and slow streams; rather rare. July. (Eu.)

3. ZOSTÈRA, L. GRASS-WRACK. EEL-GRASS.

Flowers monœcious; the two kinds naked and sessile and alternately arranged in two rows on the midrib of one side of a linear leaf-like spadix, which is hidden in a long and sheath-like base of a leaf (spathe); the sterile flowers consisting of single ovate or oval 1-celled sessile anthers, as large as the ovaries, and containing a tuft of threads in place of ordinary pollen: the fertile of single ovate-oblong ovaries attached near their apex, tapering upward into an awl-shaped style, and containing a pendulous orthotropous ovule: stigmas 2, long and bristle-form, deciduous. Utricle bursting irregularly, enclosing an oblong longitudinally ribbed seed (or nutlet). Embryo short and thick (proper cotyledon almost obsolete), with an open chink or cleft its whole length, from which protrudes a doubly curved slender plumule. — Grass-like marine herbs, growing wholly under water, with a jointed creeping stem or rootstock, sheathed by the bases of the very long and linear, obtuse, entire, grass-like, ribbon-shaped leaves (whence the name, from *ζωστήρ, a band*).

1. **Z. marina,** L. Leaves obscurely 3-5-nerved. — Common in bays along the coast; in water of 5°-15° deep. Aug. (Eu.)

4. RÚPPIA, L. DITCH-GRASS.

Flowers perfect, 2 or more approximated on a slender spadix, which is at first enclosed in the sheathing spathe-like base of a leaf, naked (entirely destitute of floral envelopes), consisting of 2 sessile stamens, each with 2 large and separate anther-cells and 4 small sessile ovaries, with a single campylotropous suspended ovule: stigma sessile, depressed. Fruit of little obliquely-ovate pointed drupes, each raised on a slender stalk which appears after flowering; the spadix itself also then raised on an elongated thread-form peduncle. Embryo ovoid, with a short and pointed plumule from the upper end, by the side of the short cotyledon. — Marine herbs, growing under water, with long and thread-like forking stems, slender and almost capillary alternate leaves with a dilated sheathing base. Flowers rising to the surface at the time of expansion. (Dedicated to *Ruppius*, a German botanical author of the early part of the 18th century.)

1. **R. marítima,** L. Leaves linear-capillary; nut ovate, obliquely erect; fruiting peduncles capillary (½′-1′ long). — Shallow bays, along the whole coast: chiefly a narrowly leaved variety with strongly pointed fruit, approaching R. rostellàta, *Koch*. June-Aug. (Eu.)

5. POTAMOGÈTON, Tourn. PONDWEED.

Flowers perfect, spiked. Sepals 4, rounded, valvate in the bud. Stamens 4, nearly sessile, opposite the sepals: anthers 2-celled. Ovaries 4 (rarely only one), with an ascending campylotropous ovule: stigma sessile or on a short style. Nutlets drupe-like when fresh, more or less compressed. Seed curved or cochleate; the radicular end of the embryo pointing downwards. — Herbs of fresh or barely brackish ponds and streams, with jointed creeping and rooting stems, and 2-ranked pellucid leaves, which are usually alternate or imperfectly opposite; the upper sometimes dilated, of a firmer texture, and floating. Stipules membranous, more or less united and sheathing. Spikes sheathed by the stipules in the bud, raised on a peduncle to the surface of the water. (An ancient name, composed of *ποταμός, a river*, and *γείτων, a neighbor*, from their place of growth.)

§ 1. *Stipules united with the sheathing base of the leaf, scarious: leaves all immersed and similar, alternate, grass-like: stigma terminal: seed hooked-curved.*

1. **P. pectinàtus,** L. Stems thread-like, many times forked; *leaves bristle-form,* 1-*nerved* (2′ – 4′ long); *spikes interrupted,* long-peduncled; **nutlets** rounded-obovate. — Brackish water along the coast (P. marinum, *L.*); also not rare in fresh water, especially along the Great Lakes and northward. (Eu.)

2. **P. Robbinsii,** Oakes. Stem sparingly branched, rigid, very leafy; *leaves linear, flat, abruptly pointed, many-nerved, serrulate-ciliate,* approximate (3′ – 4′ long, 3″ – 4″ wide), recurved-spreading; spikes oblong. — Ponds, not uncommon in New England, detected in 1829 by *Dr. Robbins.* White Plains, New York, *H. J. Clark.* Ohio, *Dr. Canfield.* — A very remarkable species. Stems 1° – 3° long, entirely invested by the sheathing bases of the leaves and the elongated and taper-pointed free portion of the stipules. Ripe fruit not seen.

§ 2. *Stipules of the immersed (alternate) leaves adherent, as in* § 1, *those of the floating leaves free from the petiole or nearly so: stigma becoming somewhat lateral: fruit and seed cochleate.*

3. **P. hýbridus,** Michx. Slender (6′ – 12′ long), branching; immersed leaves narrowly linear or almost capillary; the floating ones varying from linear or lanceolate to oval (½′ – 1′ long), 3 – 7-nerved, short-petioled, rarely wanting; spikes capitate, few-flowered, lateral, on very short somewhat club-shaped peduncles; fruit small (½″ – ⅔″ long), orbiculate, flattened on the sides, keeled on the back, the keel more or less toothed or crested; embryo spirally coiled. (P. diversifolius, *Barton.* P. setaceus, *Pursh.* P. Spirillus, *Tuckerman:* a slender form.) — Shallow pools; common, especially southward. — Var. SPICÀTUS, *Engelm.*, is a form with longer spikes (¼′ – ½′ long), W. Illinois and southward.

§ 3. *Stipules all entirely free from the petiole or leaf: leaves alternate: stigma terminal: seed hooked-curved or nearly forming a ring.*

* *Leaves grassy-linear or thread-shaped, sessile, all immersed: stems branching.*

4. **P. Tuckermáni,** Robbins, in herb. Slender and very delicate; stem terete, much branched; *leaves setaceous or capillary.* tapering to a sharp point, *nearly terete, nerveless, pellucid* (conferva-like, about 2′ long); spike few-flowered, long-peduncled; *fruit thick, obscurely 3-carinate* when dry, the narrow dorsal *keel smooth and even;* style obsolete. (P. trichoides, *ed.* 1, &c., not of Cham., which is monogynous, and is rough with small tubercles on the obtusely crested keel, &c.) — Clear ponds, White Mountains, New Hampshire, *Oakes & Robbins.* Tewksbury, Mass., and in the Alleghany Mountains, *Tuckerman.*

5. **P. pusillus,** L. Stem slender, obscurely compressed; *leaves narrowly linear, rather acute,* 3 – 5-*nerved; spikes* 4 – 8-*flowered, lax,* often interrupted, *long-peduncled: fruit crestless.* (P. compressus, *Smith.*) — Ponds and clear pools; rather common northward. (Eu.)

6. **P. pauciflòrus,** Pursh. Stem very slender and thread-like, but flattish; *leaves narrowly linear, acutish,* 3-*nerved; spikes few-* (4 – 6-) *flowered, short-peduncled; fruit distinctly crested* or sinuate-toothed on the back. (P. gramineus, *Michx.*) — Ponds and streams; common, especially southward. — Leaves 1′ – 3′ long, ½″ – 1″ wide.

Var. **Niagarénsis** (P. Niagarensis, *Tuckerm.*), from the brink of the cataract of Niagara, appears likely to be a larger-leaved and more rigid state of this species; the stipules more conspicuous, the leaves sometimes 1½″ wide.

7. **P. comprésssus,** L. ex Fries. *Stem very flat, almost as wide as the narrowly linear abruptly pointed leaves; spikes cylindrical,* 10–15-*flowered;* fruit obtusely keeled. (P. zosteræfolius, *Schum.*)—Ponds, New England to Penn., Wisconsin, and northward.—Stems 2°–4° long. Leaves 3′–6′ long, 1½″ wide, minutely many-nerved and with a midrib or 3 nerves more conspicuous; perfectly entire. (Eu.)

* * *Leaves ovate or oblong, with a clasping base, all immersed, thin and pellucid, many-nerved, and with cross veinlets: stems more or less branched.*

8. **P. perfoliàtus,** L. *Leaves clasping by a heart-shaped base, ovate or ovate-lanceolate,* sometimes *round-ovate, obtuse;* spikes rather few-flowered; *fruit rounded on the back.*—Ponds and rivers; common.—Leaves 1′–2′ long, flat; or, in the longer and ovate-lanceolate American forms, inclined to be acute and more or less wavy or crisped. (Eu.)

9. **P. praelóngus,** Wulf. *Leaves elongated-oblong, obtuse at both ends, half-clasping by the sessile base;* peduncles often much elongated (in deep water 6′–12′ long); spike cylindrical, many-flowered; *fruit strongly keeled* on the back when dry.—Rivers and ponds, New England to Wisconsin and northward.—Stipules wingless. Leaves 1′ or less wide, 2′–7′ long. (Eu.)

* * * *Leaves not clasping, mostly of* 2 *sorts; the immersed ones acute at the base or tapering into a petiole, thin and pellucid, many-nerved and reticulated by cross-veinlets, the floating ones somewhat coriaceous and long-petioled: stems simple or sparingly branched.*

10. **P. lùcens,** L. Immersed leaves ample (3′–9′ long), varying from oblong-oval to broadly lanceolate, undulate, somewhat petioled; the united *stipules* 2-*winged or keeled on the back; peduncle thickened,* especially upwards; spike elongated, dense; *fruit* 1–3-*keeled* on the back.—The proper P. lucens usually wants the floating leaves, and is common in deep water. (Eu.)

Var.? **flùitans.** Uppermost leaves floating on distinct but rarely very long petioles, varying from oblong-lanceolate and acute at each end to ovate and obtuse or heart-shaped (2′–4′ long). P. fluitans, *Roth.*, &c.; and here I would refer P. pulcher? and P. amplifolius, *Tuckerm.* P. rufescens, *Schrader,* is a narrow-leaved form, with smaller fruit, &c., either without floating leaves (P. obrutus, *Wood*) or with them, of a brownish or reddish tinge, and verging to the larger forms of No. 12.—Mostly in rather deep water; common northward. Distinguished from P. natans by its broader and large immersed leaves, and keeled fruit. Probably P. fluitans may be separated from P. lucens, and perhaps several species with floating leaves may be here confounded; the forms are diverse, and the fruit differs in the strength of the keels, &c. But I have not been able to limit them. (Eu.)

11. **P. nàtans,** L. Immersed leaves narrowly lanceolate or linear and mostly long-petioled; the thin blade early decaying, sometimes wanting; floating leaves long-petioled, elliptical or ovate-oblong, sometimes slightly heart-shaped

at the base (1½′–4′ long, the petiole 4′–12′ long); *stipules not winged nor ridged; peduncle not thickened; fruit obtuse on the back when fresh.* (P. lonchites, *Tuckerm.*) — P. oblongus, *Viv.*, is a small-fruited form. — Ponds and slow streams; common. (Eu.)

12. **P. heterophyllus,** Schreber. Stem slender, branching; immersed leaves lanceolate or linear and sessile, or only the upper petioled; floating leaves elliptical, varying to oblong-linear, thinnish (1′–2′ long), on filiform petioles; united *stipules 2-ribbed on the back; peduncle often thickened upwards; fruit slightly keeled* when dry (one half smaller than in the preceding). (P. gramineus, *L.* in part, *Fries*, *&c.* P. Claytonii, *Tuckerm.*) — In shallow pools and ditches, as well as streams; common. (Eu.)

P. CRÍSPUS, L., I have not seen in this country. Mr. Tuckerman informs me that he has seen a specimen in a European herbarium, purporting to have been gathered in Delaware. If found, it may be distinguished from No. 8 by its lanceolate and wavy-crisped 3-nerved leaves.

P. DÉNSUS was admitted into the first edition on the authority of Beck from Schweinitz. I apprehend some mistake about it. The species, if in the country, may be known by its leaves being all opposite and without stipules.

ORDER 116. ALISMÀCEÆ. (WATER-PLANTAIN FAMILY.)

Marsh herbs, with scape-like flowering stems, and perfect or monœcious flowers, not on a spadix, furnished with both calyx and corolla: sepals and petals each 3, *distinct. Ovaries* 3 – *many, distinct or partly so, or if united separating at maturity, forming as many* 1 – 2-*seeded pods or achenia.* Seed ascending or erect. Embryo without albumen. Stamens hypogynous, 6 to many: anthers extrorse, 2-celled. Leaves sheathing at the base. Comprises two very distinct suborders, viz.: —

SUBORDER I. JUNCAGINEÆ. THE ARROW-GRASS FAMILY.

Calyx and corolla colored alike (greenish). Seed anatrópous, with a straight embryo. Leaves petiole-like, without a blade.

1. TRIGLOCHIN. Flowers perfect. Ovaries 3 - 6, united into one, but separating in fruit.
2. SCHEUCHZERIA. Flowers perfect. Ovaries 3, nearly distinct, forming diverging pods in fruit.

SUBORDER II. ALISMEÆ. THE WATER-PLANTAIN FAMILY.

Calyx green and persistent. Corolla white, deciduous. Seed campylotropous: embryo bent double or hook-shaped. Leaves commonly furnished with a blade.

3. ALISMA. Flowers perfect, with definite, mostly 6 stamens. Carpels numerous, whorled.
4. ECHINODORUS. Flowers perfect, with 7 - 21 stamens. Carpels capitate, ribbed.
5. SAGITTARIA. Flowers monœcious. Stamens indefinite. Carpels capitate, winged.

Suborder I. JUNCAGÍNEÆ. The Arrow-grass Family.

1. TRIGLÒCHIN, L. Arrow-grass.

Sepals and petals nearly alike (greenish), ovate, concave, deciduous. Stamens 6: anthers oval, on very short filaments. Pistils united into a 3–6-celled compound ovary: stigmas sessile: ovules solitary. Pod splitting when ripe into 3–6 carpels, which separate from a central axis. — Leaves rush-like, fleshy, sheathing the base of the wand-like naked and jointless scape. Flowers small, in a spiked raceme, bractless. (Name composed of τρεῖς, *three*, and γλωχίν, *point*, from the three points of the ripe fruit in No. 1.)

1. **T. palústre,** L. *Scape* (6′–18′ high) *and leaves slender; fruit linear-club-shaped; the* 3 *carpels* when ripe separating from below upwards from the triangular axis, and *awl-pointed at the base.* ♃ — Marshes, both fresh and brackish, New York to Ohio and northward. Aug. (Eu.)

2. **T. marítimum,** L. *Scape* (12′–20′ high) *and leaves thickish, fleshy; fruit ovate or oblong, acutish, of* 6 *or rarely* 5 *carpels* which are *rounded at the base and slightly grooved on the back;* the edges acute. ♃ — Salt marshes along the coast; salt springs, Salina, New York; shore of the Great Lakes, and northward. — Var. ELÀTUM (T. elatum, *Nutt.*) grows in cold and fresh bogs, from W. New York to Wisconsin, often 2½° high, and has the angles of the carpels sharper, or almost winged. (Eu.)

2. SCHEUCHZÈRIA, L. Scheuchzeria.

Sepals and petals oblong, spreading, nearly alike (greenish-yellow), but the latter narrower, persistent. Stamens 6: anthers linear. Ovaries 3, globular, slightly united at the base, 2–3-ovuled, bearing flat sessile stigmas, in fruit forming 3 diverging and inflated 1–2-seeded pods, opening along the inside. — A low bog-herb, with a creeping jointed rootstock, tapering into the ascending simple stem, which is zigzag, partly sheathed by the bases of the grass-like conduplicate leaves, terminated by a loose raceme of a few flowers, with sheathing bracts. (Named in honor of the two brothers *Scheuchzer*, distinguished Swiss botanists.)

1. **S. palústris,** L. — Peat-bogs, New England to Penn., Wisconsin, and northward; rather rare. July. (Eu.)

Suborder II. ALISMÈÆ. The Water-Plantain Family.

3. ALÍSMA, L. Water-Plantain.

Flowers perfect. Petals involute in the bud. Stamens definite, mostly 6. Ovaries many in a simple circle on a flattened receptacle, forming flattened coriaceous achenia, which are dilated and 2–3-keeled on the back. — Roots fibrous Leaves all from the root, several-ribbed, with connected veinlets. Scape with whorled panicled branches. Flowers small, white or pale rose-color. (The Greek name; of uncertain derivation.)

1. **A. Plantàgo,** L., var. **Americànum.** Leaves long-petioled, ovate, oblong, or lanceolate, pointed, mostly rounded or heart-shaped at the base, 3 – 9-nerved; panicle loose, compound, many-flowered (1° – 2° long); carpels 15 – 20, obliquely obovate, forming an obtusely triangular whorl in fruit. ♃ (A. triviàlis and parviflòra, *Pursh.*) — Ditches and marshy places; common. July, Aug. (Eu.)

4. ECHINÓDORUS, Richard, Engelmann.

Flowers perfect. Petals imbricated in the bud. Stamens 6 – 21 or more. Ovaries several or many, imbricated in a head, forming ribbed achenia in fruit, often beaked with a projecting persistent style. — Habit intermediate between the preceding genus and the following. (Name from ἐχινώδης, *prickly*, or from ἐχῖνος, and δορός, *a leathern bottle*, applied to the ovary, which is in most species armed with the persistent style, so as to form a sort of prickly head of fruit.)

For the elaboration of this and the next genus I am indebted to Dr. Engelmann.

1. **E. pàrvulus,** Engelm. *Leaves lanceolate or spatulate, acute* (½′ – 1½′ long, including the petiole); shoots often creeping and proliferous; scapes (1′ – 3′ high) bearing a 2 – 8-flowered umbel; pedicels reflexed in fruit; *stamens* 9; *styles much shorter than the ovary; achenia beakless*, many-ribbed. ① — Margin of shallow ponds, Michigan to Illinois and westward. — Flower 3″ broad.

2. **E. rostràtus,** Engelm. *Leaves broadly heart-shaped, obtuse*, nerved (1′ – 3′ long, excluding the petiole); *scape erect*, longer than the leaves, bearing a branched panicle of proliferous umbels; *stamens* 12; *styles longer than the ovary; achenia beaked*, many-ribbed. ① (Alisma rostrata, *Nutt.*) — Low river-bottoms, Illinois and southward. — Plant from 3′ to 2° high. Flower 5″ wide. Head of fruit ovoid, 3″ wide.

3. **E. radìcans,** Engelm. Leaves somewhat truncately broadly heart-shaped, obtuse, nerved (3′ – 8′ broad and long, long-petioled); *stems or scapes prostrate, creeping* (2° – 4° long), proliferous, bearing many whorls of flowers; *stamens about* 21; *styles shorter than the ovary; achenia short-beaked*, ribbed, the keeled back denticulate. ♃ (Alisma radicans, *Nutt.*) — Swamps, W. Illinois and southward. — Flowers about 1′ in diameter.

5. SAGITTÀRIA, L. Arrow-head.

Flowers monœcious, or often diœcious in No. 2. Petals imbricated in the bud. Stamens indefinite, rarely few. Ovaries many, crowded in a spherical head on a globular receptacle, in fruit forming flat membranaceous winged achenia. — Marsh or aquatic, chiefly perennial herbs, with milky juice and fibrous roots; the scapes sheathed at the base by the bases of the long cellular petioles, of which the primary ones, and sometimes all of them, are flattened, nerved, and destitute of any proper blade: when present the blade is arrow-shaped or lanceolate, nerved and with cross veinlets as in Alisma. Flowers (produced all summer) mostly whorled in threes, with membranous bracts; the sterile above. (Name from *sagitta*, an arrow, from the prevalent form of the leaves.)

* *Filaments slender awl-shaped, longer than the anthers: scape simple or branched.*

1. **S. falcàta,** Pursh. Scape 1°–5° high, with several of the lower whorls fertile; bracts ovate or orbicular; pedicels slender, the fertile recurved in fruit; *filaments hairy; achenia obovate-falcate, pointed with a short incurved beak: leaves lanceolate or lance-oblong,* all with a tapering base, thick (6′–18′ long, and on a long and stout petiole), the *nerves mostly arising from the very thick midrib.* (S. lancifolia, *Michx.*) — Swamps, Virginia and southward. — Known at once by its coriaceous and large, thick-ribbed, never sagittate leaves, &c.

2. **S. variábilis,** Engelm. Scape (¼°–4° high) 12-angled, with one or more of the lower whorls fertile; bracts pointed; *pedicels of the fertile flowers about half the length of the sterile ones;* petals with white claws; *filaments glabrous,* nearly twice the length of the anthers; *achenia obovate, with a long and curved beak* of ¼ or ⅓ its length; *leaves* very various, mostly *sagittate.* (S. sagittifolia, *Amer. auth., &c.* The European species has the fertile pedicels only ⅓ or ¼ the length of the sterile, the claws of the petals purple-tinged, the filaments not longer than the anthers; the achenia almost orbicular, very broadly winged, and short-beaked.) — In water or wet places; very common. — Excessively variable in size and foliage: the following are the leading forms. Var. OBTÙSA (S. obtusa, *Willd.*) is large, diœcious; the broadly sagittate leaves obtuse, ⅓°–1° long. — Var. LATIFÒLIA (S. latifolia, *Willd.*) is large, monœcious, with broad and acute sagittate leaves. — Var. DIVERSIFÒLIA, with some leaves ovate-lanceolate, others more or less sagittate. — Var. SAGITTIFÒLIA is the ordinary form, with narrowly halberd-shaped or sagittate leaves (including S. hastata, *Pursh*). — Var. ANGUSTIFÒLIA has the narrow leaves with long and linear diverging lobes, and a larger more horizontally beaked fruit. — Var. GRÁCILIS (S. gracilis, *Pursh*) is the most slender form, with nearly linear leaves and lobes.

* * *Filaments very short, with a very broad glandular base: scape commonly simple.*

3. **S. heterophýlla,** Pursh. Scape weak, at length mostly procumbent; bracts roundish, obtuse; the lowest whorl of *fertile flowers,* which are *almost sessile; the sterile flowers on long pedicels; achenia narrowly obovate, long-beaked.* — Rather common, at least southward, and nearly as variable in foliage as the last. Var. ELLÍPTICA has broad leaves (sometimes 6′ long and 5′ wide), either obtuse or cordate at the base, or sagittate. — Var. RÍGIDA (S. rigida, *Pursh*) has stout petioles and rigid narrowly lanceolate blades, acute at both ends. — Var. ANGUSTIFÒLIA has nearly linear leaves. — Var. FLÙITANS has narrowly linear and delicate floating leaves.

4. **S. símplex,** Pursh. Scape very slender, erect (3′–20′ high), the lower whorls fertile; bracts triangular, rather obtuse, the upper ones connate; *pedicels all slender, the sterile and fertile of equal length; achenia small, obovate, narrowly winged, beakless;* leaves varying from ovate-lanceolate to linear, rarely sagittate. (S. acutifolia, *Pursh,* &c.) — Rather common, especially southward. — Flowers much smaller than in any of the foregoing.

5. **S. pusílla,** Nutt. Dwarf; scape (1′–3′ high) shorter than the linear or awl-shaped entire leaves (their proper blade obscure and obtuse or none); *flowers only* 2–9, *on slender pedicels, the fertile recurved* after flowering; *stamens*

7-9; ovaries short-pointed (ripe fruit not seen). (Alisma subulata, *Pursh.*) — Low shores, near Philadelphia, &c. — Apparently distinct from dwarf forms of the last; but needs further investigation.

S. NÀTANS, Michx., apparently the only remaining good species in the United States, is only found farther south.

ORDER 117. HYDROCHARIDÀCEÆ. (FROG'S-BIT FAM.)

Aquatic herbs, with diœcious or polygamous regular flowers on scape-like peduncles from a spathe, and simple or double floral envelopes, which in the fertile flowers are united into a tube and coherent with the 1-9-*celled ovary.* Stamens 3-12, distinct or monadelphous: anthers 2-celled. Stigmas 3 or 6. Fruit ripening under water, indehiscent, many-seeded. Seeds ascending, without albumen: embryo straight.

Synopsis.

TRIBE I. STRATIOTIDEÆ. Ovary 6-9-celled: stigmas 6-9.

1. **LIMNOBIUM.** Filaments unequally united into a solid column in the staminate flowers: anthers 6-12, linear.

TRIBE II. VALLISNERIEÆ. Ovary 1-celled, with 3 parietal placentæ: stigmas 3.

2. **ANACHARIS.** Stem leafy. Tube of the perianth of the fertile flowers long and thread-form; its lobes 6.
3. **VALLISNERIA.** Stemless. Tube of the perianth not prolonged beyond the elongated ovary; its lobes 3.

1. LIMNÒBIUM, Richard. AMERICAN FROG'S-BIT.

Flowers diœcious, (or monœcious?) from sessile or somewhat peduncled spathes; the sterile spathe 1-leaved, producing about 3 long-pedicelled flowers; the fertile 2-leaved, with a single short-pedicelled flower. Calyx 3-parted or cleft; sepals oblong-oval. Petals 3, oblong-linear. Filaments entirely united in a central solid column, bearing 6-12 linear anthers at unequal heights: there are 3-6 awl-shaped rudiments of stamens in the fertile flowers. Ovary 6-9-celled, with as many placentæ in the axis, forming an ovoid many-seeded berry in fruit: stigmas as many as the cells, but 2-parted, awl-shaped (ovules orthotropous, *Torr.*). — A stemless perennial herb, floating in stagnant water, proliferous by runners, with long-petioled and round-heart-shaped leaves, which are spongy-reticulated and purplish underneath; rootlets slender, hairy. Sterile flowers rather small; the fertile larger: peduncle nodding in fruit. Petals white? (Name from λιμνόβιος, *living in pools.*)

1. **L. Spóngia,** Richard. (Hydróсharis, *Bosc.* H. cordifolia, *Nutt.*) — Braddock's Bay (Monroe County, N. Y.), Lake Ontario, *Dr. Bradley, Dr. Sartwell.* (Otherwise only in the Southern States.) Aug. — Leaves 1'-2' long, faintly 5-nerved. Peduncle of the sterile flower about 3' long, thread-like; of the fertile, only 1', stout.

2. ANÁCHARIS, Rich. (UDÒRA, *Nutt.*) WATER-WEED.

Flowers polygamo-diœcious, solitary and sessile from a sessile and tubular 2-cleft axillary spathe. Sterile flowers small or minute; with 3 sepals, barely united at the base, and usually 3 similar or narrower petals: filaments short and monadelphous at the base, or none; anthers 9, oval. Fertile flowers either pistillate or apparently perfect: perianth extended into an extremely long and capillary tube; the limb 6-parted; the small lobes (sepals and petals) obovate, spreading. Stamens 3 – 6, sometimes merely short sterile filaments, without anthers, or with imperfect ones, sometimes with oblong almost sessile anthers. Ovary 1-celled, with 3 parietal placentæ, each bearing a few orthotropous ovules; the capillary style coherent with the tube of the perianth: stigmas 3, large, 2-lobed or notched, exserted. Fruit oblong, coriaceous, few-seeded. — Perennial slender herbs, growing under water, with elongated branching stems, thickly beset with pellucid and veinless, 1-nerved, sessile, whorled or opposite leaves. The staminate flowers (which are rarely seen) commonly break off, as in Vallisneria, and float on the surface, where they expand and shed their pollen around the stigmas of the fertile flowers, which are raised to the surface by the excessively prolonged calyx-tube, varying in length according to the depth of the water. (Name formed of ἀν, *throughout*, and ἄχαρις, *without charms*, being rather homely water-weeds.)

1. **A. Canadénsis,** Planchon. Leaves in threes or fours, or the lower opposite, varying from linear to oval-oblong, obscurely and minutely serrulate; stigmas more or less 2-lobed. (Elòdea Canadensis, *Michx.* Udora Canadensis, *Nutt.* Anacharis Alsinastrum (*Babington*), Nuttallii, and Canadensis (perhaps also Chilensis), and also Apalánthe Schweinítzii, *Planchon.*) — Slow streams and ponds; common. July. (Eu. ?)

3. VALLISNÈRIA, Micheli. TAPE-GRASS. EEL-GRASS.

Flowers strictly diœcious: the sterile numerous and crowded in a head on a conical receptacle, enclosed in an ovate at length 3-valved spathe which is borne on a very short scape: stamens mostly 3. Fertile flowers solitary and sessile in a tubular spathe which is borne on an exceedingly long scape. Perianth (calyx) 3-parted in the sterile flowers; in the fertile with a linear tube coherent with the 1-celled ovary, but not extended beyond it, 3-lobed (the lobes obovate); also 3 linear small petals. Stigmas 3, large, nearly sessile, 2-lobed. Ovules very numerous on 3 parietal placentæ, orthotropous! Fruit elongated, cylindrical, berry-like. — Stemless plants, with long and linear grass-like leaves, growing entirely under water. The staminate clusters being confined to the bottom of the water by the shortness of the scape, the flower-buds themselves spontaneously break away from their short pedicels and float on the surface, where they expand and shed their pollen around the fertile flowers, which are raised to the surface at this time: afterwards the thread-form fertile scapes (2 – 4 feet long according to the depth of the water) coil up spirally and draw the ovary under water to ripen. (Named in honor of *Vallisneri*, an early Italian botanist.)

1. **V. spiràlis,** L. Leaves linear, thin, long and ribbon-like (1° – 2°

long), obscurely serrulate, obtuse, somewhat nerved and netted-veined. — Common in slow rivers, &c. August. (Eu.)

ORDER 118. BURMANNIÀCEÆ. (BURMANNIA FAMILY.)

Small annual herbs, often with minute and scale-like leaves, or those of the root grass-like; the flowers perfect, with a 6-cleft corolla-like perianth, the tube of which adheres to the 1-celled or 3-celled ovary; stamens 3 and distinct, opposite the outer divisions of the perianth; pod many-seeded, the seeds very minute. — A small chiefly tropical family, of which only one plant is found within our borders.

1. BURMÁNNIA, L. (TRIPTERÉLLA, *Michx.*)

Ovary 3-celled, with the thick placentæ in the axis. Filaments 3, very short. Style slender: stigma capitate-3-lobed. Pod often 3-winged. (Named for *J. Burmann*, an early Dutch botanist.)

1. **B. biflòra,** L. Stem low and slender (2′–4′ high), 2-flowered at the summit, or soon several-flowered; perianth (2″–3″ long) bright blue, 3-winged. (Tripterella cærulea, *Michx.*) — Peaty bogs, Virginia and southward.

ORDER 119. ORCHIDÀCEÆ. (ORCHIS FAMILY.)

Herbs, distinguished by their irregular flowers, 6-merous perianth adherent to the 1-celled ovary with 3 parietal placentæ, gynandrous stamens (only 1 or 2), and pollen cohering in waxy or mealy masses. Fruit a 1-celled 3-valved pod, with innumerable minute seeds, appearing like fine saw-dust. Perianth of 6 divisions in 2 sets; the 3 outer (*sepals*) of the same petal-like texture and appearance as the 3 inner (*petals*), of which the upper or posterior one, but by the twisting of the ovary or stalk commonly appearing the lower or anterior, differs more or less in shape or direction from the others, is often spurred or appendaged, and is called the *lip*. Opposite this, in the axis of the flower, is the *column*, which is composed of a single stamen (or in Cypripedium of 2 fertile stamens) entirely coherent and confluent with the style, on which the 2-celled anther is variously situated. — Perennial herbs, often tuber-bearing, or with tuberous or thickened roots. Leaves parallel-nerved. Flowers commonly showy and singular in shape, either spiked, racemed, or solitary, bracted. A large family, but sparingly represented in the United States.

Synopsis.

I. Anther only one.

TRIBE I. **OPHRYDEÆ.** Anther (of 2 separate cells) entirely adnate to the face of the stigma, erect. Pollen cohering into a great number of coarse grains, which are all fastened by elastic and cobwebby tissue into one large mass, with a stalk that connects it with a gland of the stigma. (Flower ringent, the lip with a spur beneath.)

1. ORCHIS. Anther-cells contiguous and parallel. Glands of the stigma, to which the base of the stalks of the 2 pollen-masses cohere, contained in a common little pouch formed of a fold or hood of the stigma
2. GYMNADENIA. Anther-cells contiguous and parallel: glands naked.
3. PLATANTHERA. Anther-cells diverging, widely separated at the base: glands naked.

TRIBE II. **NEOTTIEÆ.** Anther dorsal (attached to the back of the column), erect, parallel with the stigma; the 2 cells approximate. Pollen rather loose and powdery, or elastically cohering

4. GOODYERA. Lip entire, free from the column, strap-pointed. Pollen-masses elastic.
5. SPIRANTHES. Lip nearly entire, channelled, pointless, ascending, embracing the column.
6. LISTERA. Lip flat, spreading or pendulous, 2-lobed at the apex.

TRIBE III. **ARETHUSEÆ, MALAXIDEÆ,** &c. Anther terminal (attached to the apex of the column, or near it), and like a lid over the stigma, at length deciduous

* Pollen in loose or powdery grains, forming 2 or 4 delicate masses.

7. ARETHUSA. Lip bearded, its base adherent to the linear column. Pollen-masses 4.
8. POGONIA. Lip more or less crested, free from the club-shaped column. Pollen-masses 2.
9. CALOPOGON. Lip bearded, stalked, free: column winged at the apex. Pollen-masses 2

* * Pollen in smooth and finally waxy masses

+ Pollen-masses attached by elastic stalks, or in No. 10 sessile

10. CALYPSO. Lip inflated and sac-like, notched at the apex and 2-pointed underneath the notch. Column winged and petal-like Pollen-masses 4. Stem 1-flowered.
11. TIPULARIA Lip short and flat, with a long and thread-like spur beneath. Column margined. Pollen-masses 4. Raceme many-flowered.
12. BLETIA. Lip hooded, spurless. Column not margined. Pollen-masses 8.

+ + Pollen-masses without any stalks or connecting tissue.

++ Plants green and with leaves. Sepals spreading: lip flat and spurless

13. MICROSTYLIS. Lip arrow-shaped or heart-shaped. Column minute, round.
14. LIPARIS. Lip entire, dilated. Column elongated, margined at the apex.

++ ++ Plants tawny or purplish, leafless, or with a root-leaf only: sepals and petals conniving.

15. CORALLORHIZA. Lip with a spur or projection at the base adherent to the ovary. Anther-cells oblique.
16. APLECTRUM. Lip spurless, free, raised on a claw. Anther rather lateral.

II. Anthers two.

TRIBE IV. **CYPRIPEDIEÆ.** The 2 anthers those of the lateral stamens: the third or upper stamen (which is the one which bears the anther in the rest of the order) here forming a petal-like sterile appendage to the column

17. CYPRIPEDIUM. Lip a large and inflated sac, somewhat slipper-form.

1. ÓRCHIS, L. ORCHIS.

Flower ringent; the sepals and petals nearly equal, all of them, or all but the 2 lower sepals, converging upwards and arching over the column. Lip turned downwards, coalescing with the base of the column, spurred at the base underneath. Anther-cells contiguous and parallel. Pollen cohering in numerous coarse waxy grains, which are collected on a cobweb-like elastic tissue into 2 large masses (one filling each anther-cell) borne on a slender stalk, the base of which is attached to the 2 glands of the stigma, contained in a common little pouch or hooded fold. Flowers showy, in a spike. (Ὄρχις, the ancient name.)

1. **O. spectábilis,** L. (SHOWY ORCHIS.) Root of thick fleshy fibres,

producing 2 oblong-obovate shining leaves (3-5′ long) and a few-flowered 5-angled scape (4′-7′ high); bracts leaf-like, lanceolate; sepals and petals all vaulted, pink-purple, the ovate undivided lip white. — On hills in rich woods, New England to Kentucky and (especially) northward. May.

2. GYMNADÈNIA, R. Brown. NAKED-GLAND ORCHIS.

Flower as in Orchis. Anther-cells parallel; the approximate glands naked (whence the name, from γυμνός, *naked*, and ἀδήν, *gland*).

1. **G. tridentàta,** Lindl. Stem slender (6′-12′ high), with a single oblong or oblanceolate obtuse leaf below, and 2 or 3 small ones like bracts above; *spike* 6-12-*flowered*, oblong; *lip wedge-oblong, truncate and with* 3 *short teeth at the apex;* the slender and slightly club-shaped spur curved upwards, longer than the ovary. — Wet woods; rather common, especially northwards. July. — Root of few fleshy fibres. Flowers small, pale yellowish-green.

2. **G. flàva,** Lindl. Stem several-leaved (15′ high), the 1 or 2 lower leaves elongated, oblong-lanceolate, acute; the others becoming smaller and bract-like; *spike densely many-flowered,* oblong-cylindrical; *lip ovate, a little crenate or wavy-margined,* shorter than the awl-shaped depending spur. — Wet pine barrens of New Jersey, Virginia, and southward. July. — Root of very fleshy fibres, one or two of them tuber-like. Flowers orange-yellow, closely set. (Orchis flava & integra, *Nutt.* Habenaria Elliottii, *Beck.*)

3. PLATANTHÈRA, Richard. FALSE ORCHIS.

Flower as in Orchis, &c. (lateral sepals spreading, except in No. 5); but the anther-cells diverging below, and the 2 naked glands widely separated (whence the name, from πλατύς, *wide*, and ἀνθηρά, for *anther*).

§ 1. *Scape* 1-*leaved at the base: spur not exceeding the lip: root of thick fibres.*

1. **P. obtusàta,** Lindl. (DWARF ORCHIS.) *Leaf obovate,* obtuse; spike loosely 5-10-flowered; upper sepal broad and rounded; petals bluntly triangular; *lip linear, entire,* bearing 2 small tubercles at the base, about the length of the curving spur. — Cold peat-bogs and high mountains, Maine to N. New York and L. Superior. June. — Scape 5′-8′ high. Flowers ¼′ long. (Eu.)

2. **P. rotundifòlia,** Lindl. (SMALL ROUND-LEAVED ORCHIS.) *Leaf round-ovate or orbicular* (2′-3′ wide); spike several-flowered; *lip* 3-*lobed,* larger than the ovate petals and sepals, the middle lobe larger and inversely heart-shaped. — Along the boundary between Maine and New Brunswick (*Mr. Goodrich*), and northward. — Scape 8′ high. Leaf, and sometimes the white flowers, spotted with purple: lip ½′ long.

§ 2. *Scape* 2-*leaved at the base: spur very long: lip entire: roots thickened.*

3. **P. orbiculàta,** Lindl. (LARGE ROUND-LEAVED ORCHIS.) Leaves very large (4′-8′ wide), orbicular, spreading flat on the ground; scape bracted, bearing many spreading *greenish-white flowers in a loose raceme;* upper sepal orbicular, the lateral ovate; *lip narrowly linear-spatulate,* drooping, nearly thrice the length of the ovate reflexed petals; *spur curved,* slender (1½′-2′ long), grad-

ually *thickened towards the apex, blunt, twice the length of the ovary.* — Rich woods, under Hemlocks, &c., W. New England to Wisconsin; rather rare, chiefly northward, and southward along the Alleghanies. July. — Leaves very smooth, shining above, silvery underneath. Scape 1° – 2° high.

4. **P. Hoókeri,** Lindl. (Smaller Two-leaved Orchis.) Leaves orbicular, spreading (3′ – 4′ broad); scape mostly naked (½° – 1° high), bearing 10 – 20 upright sessile *yellowish-green flowers in a strict spike;* sepals ovate-lanceolate; lip lanceolate, pointed, a little incurved, longer than the linear-lanceolate petals; *spur slender, acute, about the length of the ovary* (¾′ long). — Woods, Rhode Island to Ohio and Wisconsin. June.

§ 3. *Stem leafy: lip entire (or nearly so), nearly equalling or exceeding the spur: root a cluster of fleshy branches or fibres.*

5. **P. bracteàta,** Torr. (Bracted Green Orchis.) *Lower leaves obovate,* the upper oblong and gradually reduced to lanceolate acute *bracts* 2 – 3 *times the length of the small green flowers;* spike loose; *sepals and linear-lanceolate petals erect; lip oblong-linear or slightly spatulate, truncate and minutely* 2 – 3*-toothed at the tip, more than twice the length of the sac-like somewhat 2-lobed spur.* — Damp woods; common northward. June. — Stem 6′ – 12′ high, 6 – 12-flowered. (Eu.?)

6. **P. hyperbòrea,** Lindl. (Northern Green Orchis.) Stem very leafy; *leaves lanceolate,* erect; spike densely many-flowered; lower bracts lanceolate, longer than the (*greenish*) *flowers; lip and petals lanceolate, somewhat equal, as long as the obtuse spur.* (P. Huronensis, *Lindl.*) — Peat-bogs and wet cold woods; common northward. June, July. — Stem 6′ – 2° high, strict: crowded spike of small flowers 2′ – 1° long. Lip as long as the sepals, obtusish, entire, not dilated at the base. (Eu.?)

7. **P. dilatàta,** Lindl. (Northern White Orchis.) *Leaves lanceolate or linear,* erect; spike wand-like, densely or rather loosely-flowered; bracts linear-lanceolate, mostly shorter than the (*white or whitish*) *flowers;* petals linear-lanceolate; *lip linear-lanceolate from a rhomboid-dilated base,* rather obtuse, about the length of the obtuse spur. — Cold peat-bogs, &c.; common northward. June, July. — Usually more slender than the last, but often as tall, and too nearly related to it.

8. **P. flàva,** Gray. (Yellowish Orchis.) *Leaves ovate-oblong or oblong-lanceolate;* the uppermost linear-lanceolate and pointed, passing into the bracts of the elongated raceme; petals ovate; *lip oblong,* obtuse or barely notched at the apex, furnished *with a tooth on each side near the base and a small protuberance on the palate,* about the length of the sepals, half the length of the club-shaped spur. (Orchis flava, *L.!* O. virescens, fuscescens, herbiola, and bidentata, of authors.) — Wet places; common. June – Aug. — Stem 10′ – 20′ high; the spike at first dense, with the bracts longer than the flowers, at length elongated and often loose, with the upper bracts shorter than the flowers; which are quite small, dull greenish-yellow, drying brownish.

§ 4. *Stem leafy: lip fringed along the sides, undivided, shorter than the spur: ovary taper-beaked: root a cluster of thick and fleshy fibres.*

9. **P. cristàta,** Lindl. (Crested Orchis.) Lower leaves lanceolate, elongated; the upper gradually reduced to sharp-pointed *bracts, nearly the length*

of the crowded (yellow) flowers; spike oblong or cylindrical; petals rounded, crenate; *lip ovate, with a lacerate-fringed margin, scarcely shorter than the* slender obtuse incurved *spur,* which is not half the length of the ovary. — Bogs, Penn. (*Pursh*) to Virginia and southward. — Flowers one quarter the size of the next.

10. **P. ciliàris,** Lindl. (YELLOW FRINGED-ORCHIS.) Leaves oblong or lanceolate; the upper passing into pointed *bracts,* which are *shorter than the long-beaked ovaries;* spike oblong, rather closely many-flowered; *flowers bright orange-yellow;* lateral sepals rounded, reflexed; petals linear, cut-fringed at the apex; *lip oblong, about half the length of the spur, furnished with a very long and copious capillary fringe.* — Bogs and wet places; scarce at the North; common southward. July, Aug. — Our handsomest species, 1½° - 2° high, with a short spike of very showy flowers; the lip ½' long, the conspicuous fringe fully ¼' long on each side.

11. **P. blepharigl*ó*ttis,** Lindl. (WHITE FRINGED-ORCHIS.) Leaves, &c. as in the last; *flowers white;* petals spatulate, slightly cut or toothed at the apex; lip oblong or lanceolate-oblong, with the irregular capillary fringe of the margins usually shorter than the disk, one third the length of the spur. — Var. HOLOPÉTALA (P. holopetala, *Lindl.*) has narrower petals with the toothing obsolete, and the lip less fringed. — Peat-bogs and borders of ponds, with No. 10, or commonly taking its place in the North. July. — A foot high, the flowers beautiful, but rather smaller than in the last.

§ 5. *Stem leafy: lip 3-parted, shorter than the somewhat club-shaped long spur, narrowed at the base into a claw: roots clustered and fleshy-thickened.*

* *Flowers white or greenish.*

12. **P. leucophæa,** Nutt. (WESTERN ORCHIS.) Leaves oblong-lanceolate; the bracts similar, rather shorter than the (large dull white) flowers; spike elongated, loose; *petals obovate, minutely cut-toothed; divisions of the lip broadly wedge-shaped or fan-shaped, many-cleft to the middle into a thread-like fringe;* spur longer than the ovary. — Moist meadows, Central Ohio to Wisconsin and southwestward. July. — Stem 2° - 4° high; the spike at length 1° long. Lip about ¾' wide.

13. **P. lácera,** Gray. (RAGGED ORCHIS.) Leaves oblong or lanceolate; raceme loosely many-flowered; *petals oblong-linear, entire; divisions of the lip narrow, deeply parted into a few long nearly capillary lobes;* spur about the length of the ovary. (O. psycodes, *Muhl.,* &c., not of *L.* O. lacera, *Michx.*) — Bogs and moist thickets; rather common. July. — Stem 1° - 2° high: bracts shorter or longer than the pale yellowish-green flowers.

* * *Flowers purple.*

14. **P. psycòdes,** Gray. (SMALL PURPLE FRINGED-ORCHIS.) Leaves oblong, the uppermost passing into linear-lanceolate bracts; *raceme cylindrical, densely many-flowered; lower sepals round-oval, obtuse; petals wedge-obovate or spatulate, denticulate above;* divisions of the spreading lip broadly wedge-shaped, many-cleft into a *short fringe.* (O. psycodes, *L.!* O. fimbriata, *Pursh, Bigelow.* O. incisa and O. fissa, *Muhl. in Willd.*) — Moist meadows and alluvial banks; common. July, Aug. — Stem 2° high. Flowers short-pedicelled, crowded in

a spike 4′–7′ long, small, but very handsome, fragrant: lip short-stalked, barely ⅓′ broad and not so long; the middle lobe broadest and more closely fringed, but not so deeply cleft as the lateral ones.

15. **P. fimbriàta,** Lindl. (LARGE PURPLE FRINGED-ORCHIS.) Lower leaves oval or oblong, the upper few, passing into lanceolate bracts; *spike or raceme oblong, loosely-flowered; lower sepals ovate, acute; petals oblong, toothed down the sides;* divisions of the pendent large lip fan-shaped, many-cleft into a *long capillary fringe.* (O. fimbriata, *Ait.*, *Willd.*, *Hook. Exot. Fl.*, &c. O. grandiflora, *Bigelow.*) — Wet meadows, &c., New England to Penn., and (chiefly) northeastward. June. — Stem 2° high. Flowers fewer, paler (or lilac-purple), and 3 or 4 times larger than those of No. 14; the more ample dilated lip ¾′ to 1′ broad, with a deeper and nearly capillary crowded fringe, different-shaped petals, &c.

16. **P. peramœna,** Gray. (GREAT PURPLE ORCHIS.) Lower leaves oblong-ovate, the upper lanceolate; spike oblong or cylindrical, densely flowered; lower sepals round-ovate; petals rounded-obovate, raised on a claw; *divisions of the large lip very broadly wedge-shaped, irregularly eroded-toothed* at the broadly dilated summit, *the lateral ones truncate, the middle one 2-lobed.* (P. fissa, *Lindl.* O. fissa, *Pursh*, not of *Muhl.*) — Moist meadows and banks, Penn. to Ohio, Kentucky, and southward along the Alleghanies. Aug. — Stem 2°–4° high. Flowers large and showy, violet-purple; the lip paler and very ample, ¾′ long: its divisions minutely and variably toothed, or sparingly cut along the terminal edge, but not fringed.

4. GOODYÈRA, R. Brown. RATTLESNAKE-PLANTAIN.

Flower ringent; lateral sepals not oblique at the base, including the saccate sessile base of the lip, which is free from the small straight column, without callosities, and contracted at the apex into a pointed and channelled recurved termination. Anther attached to the back near the summit of the column. Pollen-masses 2, consisting of angular grains loosely cohering by a manifest web. — Root of thick fibres from a fleshy somewhat creeping rootstock, bearing a tuft of thickish petioled leaves next the ground. Scape, spike, and the greenish-white small flowers usually glandular-downy. (Dedicated to *John Goodyer*, an early English botanist.)

1. **G. rèpens,** R. Brown. Small (5′–8′ high) and slender; leaves ovate, more or less reticulated with white (about 1′ long); *flowers several, in a loose 1-sided spike;* lip inflated, the apex oblong and obtuse; stigma distinctly 2-toothed. — Rich woods, under evergreens; common northward, and southward along the Alleghanies. Aug. — Intermediate forms apparently occur between this and the next. (Eu.)

2. **G. pubéscens,** R. Brown. Leaves ovate, conspicuously reticulated and blotched with white (2′ long); *flowers numerous in a crowded spike, not 1-sided;* lip inflated, and with an abrupt ovate apex; stigma rounded at the summit. — Rich woods; rather common, especially southward. July, Aug. — Scape 8′–12′ high.

5. SPIRÁNTHES, Richard. Ladies' Tresses.

Flower somewhat ringent; the lateral sepals rather oblique at the base and somewhat decurrent on the ovary, covering the base of the lip; the upper one cohering with the petals; all usually erect. Lip oblong, concave and embracing the wingless column below, furnished with 2 callosities next the base, contracted into a short claw below them or sessile, the spreading apex more or less dilated. Column arching, obliquely short-stalked, the ovate stigma usually with a short-pointed and at length 2-cleft beak. Anther attached to the back of the column. Pollen-masses 2, club-shaped or obovate, fixed to the stigma by a gland, deeply 2-cleft from the broader end (and in S. gracilis again 2-cleft) into tender lamellæ which are more or less inrolled when young, bearing the powdery pollen-grains. — Roots clustered-tuberous. Stems naked, or leafy below. Flowers small, white, bent horizontal, in a close usually spirally twisted spike (whence the name, from *σπεῖρα*, *a coil* or *curl*, and *ἄνθος*, *blossom*).

* *Scape naked, barely bracted below: leaves all at or near the ground, early disappearing: flowers all one-sided.*

1. **S. grácilis,** Bigelow. Scape very slender (8'–15' high), smooth; spike slender, so twisted as to throw the flowers as they expand all into a single (straightish or usually spiral) row; bracts ovate, pointed, not longer than the pods, to which they are closely appressed; lip spatulate-oblong, strongly wavy-crisped at the rounded summit (not lobed), the callosities at the base conspicuous, incurved; leaves varying from ovate to oblong-lanceolate, petioled (1'–2 long), thin. (Also S. Beckii, *Lindl.*, as to the Northern plant.) — Hilly woods and sandy plains: common. July, Aug. — Perianth and lip ⅙'–¼' long, of a delicate pearly texture: the *calli* at first oval, bearded at the base inside, at length elongating and recurved.

* * *Scape or stem leafy towards the base: flowers not unilateral.*

2. **S. latifòlia,** Torr. in Lindl. *Low* (4'–9' high); *leaves oblong-lanceolate,* narrowed into a sheathing base; spike oblong, rather dense, more or less twisted; bracts lanceolate, acutish, the lower as long as the flowers; lip oblong, very obtuse, wavy-crisped at the apex, 5–7-nerved below, and with 2 oblong adnate callosities at the base. (S. plantaginea, *Torr. in N. Y. Fl.*, not of *Lindl.* S. æstivàlis, *Oakes, cat.*) — Moist banks, N. New York, W. New England, and northward; not rare. June. — Leaves chiefly towards the base of the stem, 2'–4' long and about ½' wide, thickish; above are one or two small leaf-like bracts. Flowers white with the lip yellowish, larger than in No. 1, much smaller than in No. 3; the sepals minutely glandular-pubescent, as well as the axis of the spike. — I find nothing to distinguish it from S. æstivalis except that the flowers are a trifle smaller, and the bracts less acute.

3. **S. cérnua,** Richard. *Root-leaves linear-lanceolate, elongated,* those of the stem similar but smaller, passing into bracts; spike dense, minutely pubescent; bracts ovate-lanceolate, pointed, as long as the flowers; lip oblong, furnished with two minute callosities at the base, constricted above the middle, rounded at the summit, wavy-crisped. — Wet grassy places; common. Aug.–Oct. — Stem

8'–2° high; the root leaves 4'–12' long. Spike thick, 3'–5' long, seldom twisted. Flowers white or cream-color, fragrant; the perianth about 5'' long.— The large states seem to pass into S. odorata, *Nutt.* (Eu. ?)

6. LÍSTERA, R. Brown. TWAYBLADE.

Sepals and petals nearly alike, spreading or reflexed. Lip mostly drooping, longer than the sepals, 2-lobed or 2-cleft. Column wingless: stigma with a rounded beak. Anther borne on the back of the column at the summit, ovate, pollen powdery, in 2 masses, joined to a minute gland. — Roots fibrous. Stem bearing a pair of opposite sessile leaves in the middle, and a spike or raceme of greenish or brownish-purple small flowers. (Dedicated to *Martin Lister*, an early and celebrated British naturalist.)

* *Column very short.* (*Sepals ovate, reflexed: plants delicate, 4'–8' high.*)

1. **L. cordàta,** R. Brown. Leaves round-ovate, somewhat heart-shaped (½'–1' long); raceme almost smooth, *flowers minute, crowded, on pedicels not longer than the ovary; lip* linear, twice the length of the sepals, 1-toothed on each side at the base, 2-*cleft* to the middle. — Damp cold woods; from Penn. northward. June, July. (Eu.)

2. **L. austràlis,** Lindl. Leaves ovate; *raceme loose and slender; flowers very small, on minutely glandular-pubescent pedicels twice the length of the ovary; lip* linear, 3–4 times the length of the sepals, 2-*parted, the divisions linear-setaceous.* — Damp thickets, New Jersey to E. Virginia and southward. June.

* * *Column longer, arching or straightish.*

3. **L. convallarioìdes,** Hook. Leaves oval or roundish, and sometimes a little heart-shaped (1'–1½' long); raceme loose, pubescent; flowers on slender pedicels; lip wedge-oblong, 2-lobed at the dilated apex, and 1-toothed on each side at the base, nearly twice the length of the narrowly lanceolate spreading sepals, purplish, ½' long. (Epipactis convallarioides, *Swartz.*) — Damp mossy woods, along the whole Alleghany Mountains, to Penn., N. New England, Lake Superior, and northward. — Plant 4'–9' high.

7. ARETHÙSA, Gronov. ARETHUSA.

Flower ringent; the lanceolate sepals and petals nearly alike, united at the base, ascending and arching over the column. Lip dilated and recurved-spreading towards the summit, bearded inside. Column adherent to the lip below, petal-like, dilated at the apex. Anther lid-like, terminal, of 2 approximate cells: pollen-masses powdery-granular, 2 in each cell. — A beautiful low herb, consisting of a sheathed scape from a globular solid bulb, terminated by a single large rose-purple and sweet-scented flower. Leaf solitary, linear, nerved, hidden in the sheaths of the scape, protruding from the uppermost after flowering. (Dedicated to the Nymph *Arethusa.*)

1. **A. bulbòsa,** L. — Bogs, Virginia to Maine, N. Wisconsin, and northward: rare. May. — Flower 1'–2' long, very handsome.

8. POGÒNIA, Juss. POGONIA.

Flower irregular, the sepals and petals separate. Lip crested or 3-lobed. Column free, elongated, club-shaped, wingless. Anther terminal and lid-like, stalked: pollen-masses 2 (one in each cell), powdery-granular. — Stem 1-5-leaved. (Πωγωνίας, *bearded*, from the lip of some of the original species.)

§ 1. POGONIA PROPER. — *Sepals and petals nearly equal and alike, pink-purple.*

1. **P. ophioglossoìdes,** Nutt. Root of thick fibres; *stem* (6′-9′ high) *bearing one clasping oval or lanceolate leaf near the middle,* and a smaller similar bract next the solitary flower; lip spatulate, beard-crested and fringed. — Bogs; common. June, July. — Flower handsome, 1′ long, pale purple, rarely 2 or 3.

2. **P. péndula,** Lindl. *Stem* (3′-6′ high) from oblong tubers, *bearing 3 or 4 alternate ovate-clasping small leaves,* and nearly as many drooping flowers on axillary pedicels; lip spatulate, somewhat 3-lobed, roughish or crisped above, but not crested. (Triphora, *Nutt.*) — Rich damp woods, from W. New England southward and westward: rare. Aug., Sept. — Flowers whitish, tinged with pink, 1′ long; sepals and petals erect.

§ 2. ODONÉCTIS, Raf. — *Sepals linear, much longer than the erect petals: lip 3-lobed, the middle lobe crested: flowers dingy purple.*

3. **P. verticillàta,** Nutt. Root of thick fibres; stem (6′-12′ high) bearing a *whorl of 5 oval or oblong-obovate pointed sessile leaves at the summit,* 1-flowered; *sepals erect* (1′-2′ long). — Bogs; W. New England to Michigan, Kentucky, and southward: scarce. June.

4. **P. divaricàta,** R. Br. Stem (2° high) bearing *one lanceolate leaf in the middle, and a leafy bract* next the single flower; *sepals widely spreading* (2′-2½′ long). — Wet pine-barrens, Virginia and southward. May.

9. CALOPÒGON, R. Brown. CALOPOGON.

Flower with the ovary or stalk not twisting, therefore presenting its lip on the upper or inner side! Sepals and petals nearly alike, lance-ovate, spreading, distinct. Lip rather spreading, raised on a narrowed base or stalk, dilated at the summit, strongly bearded along the upper side. Column free, winged at the apex. Anther terminal and lid-like, sessile: pollen-masses 2 (one in each cell), of soft powdery grains. — Scape from a solid bulb, sheathed below by the base of the grass-like leaf, naked above, bearing several flowers. Bracts minute. (Name composed of καλὸς, *beautiful,* and πώγων, *beard,* from the bearded lip.)

1. **C. pulchéllus,** R. Brown. Leaf linear; scape about 1° high, 2-6-flowered; lip beautifully bearded towards the dilated summit with white, yellow, and purple club-shaped hairs. — Bogs; common. July. — Flowers 1′ broad, pink-purple, fragrant.

10. CALỲPSO, Salisb. CALYPSO.

Sepals and petals nearly similar, ascending, spreading, lanceolate, pointed. Lip larger than the rest of the flower, sac-shaped, inflated, 3-lobed at the apex, the middle lobe bearded above, and 2-pointed underneath. Column erect, broadly winged and petal-like. Anther lid-like, just below the apex of the column: pollen-masses 2, waxy, each 2-parted, sessile on the membranaceous gland. — A little bog-herb; the solid bulbs producing a single petioled ovate or slightly heart-shaped thin leaf, and a short (3′ – 5′ high) scape, sheathed below, bearing a large and showy (variegated purple and yellow) flower. (Name from the goddess *Calypso.*)

1. **C. boreàlis,** Salisb. — Cold bogs and wet woods, the bulbs resting in moss, N. New England to N. Michigan, and northward. May. — A very rare and beautiful plant. Lip ¾′ long, somewhat resembling that of a Lady's Slipper. (Eu.)

11. TIPULÀRIA, Nutt. CRANE-FLY ORCHIS.

Sepals and petals spreading, oblong; the latter rather narrower. Lip prolonged underneath into a thread-like ascending spur twice or thrice the length of the flower, 3-lobed; the middle lobe linear, a little wavy, as long as the petals, the side lobes short and triangular. Column narrow and wingless. Anther lid-like, terminal: pollen-masses 2, waxy, each 2-parted, connected by a linear stalk with the transverse small gland. — Herb with large solid bulbs connected horizontally, producing in autumn a single ovate nerved and plaited leaf on a slender petiole, which is tinged with purple beneath; and in summer a long and naked slender scape (10′ – 18′ high), with 1 or 2 sheaths at the base, bearing a many-flowered raceme of small greenish flowers tinged with purple. (So named from some fancied resemblance of the flowers to insects of the genus *Tipula.*)

1. **T. discolor,** Nutt. — Pine woods, Martha's Vineyard, *Oakes*. Deerfield, Massachusetts, *Prof. Hitchcock*. Vermont, *Beck*. Parma, Monroe County, New York, *Dr. Bradley*. N. Michigan, *Dr. Cooley*. Rockport, Ohio, *Dr. Bassett*. Also southward, where it is much less rare. July. — Spur almost 1′ long.

12. BLÈTIA, Ruiz & Pavon. BLETIA.

Sepals spreading, equal, rather exceeding the petals. Lip hooded, jointed, crested along the upper face, often 3-lobed. Column half-cylindrical; the fleshy anther forming a lid at its apex. Pollen-masses 8, in pairs, with a stalk to each pair, waxy, becoming powdery. — Scape many-flowered from solid tubers. (Named for *Louis Blet*, a Spanish botanist.)

1. **B. aphýlla,** Nutt. Leafless; scape (1° – 2° high) beset with purplish scales, the lower ones sheathing; flowers racemed, brownish-purple; lip not saccate. Rich woods, Kentucky and southward.

13. MICRÓSTYLIS, Nutt. ADDER'S-MOUTH.

Sepals spreading. Petals thread-like or linear, spreading. Lip auricled or halberd-shaped at the base, not tubercled, entire or nearly so. Column very small, with 2 teeth or auricles at the summit and the lid-like anther between them. Pollen-masses 4, in one row (2 in each cell), cohering by pairs at the apex, waxy, without any stalks or elastic connecting tissue. — Little herbs from solid bulbs, producing simple stems or scapes, which bear 1 or 2 leaves, and a raceme of minute greenish flowers. (Name composed of μικρός, *little*, and στυλίς, *a column* or *style*.)

1. **M. monophýllos,** Lindl. Slender (4'–6' high); leaf solitary, sheathing the base of the stem, ovate-elliptical; *raceme spiked, long and slender; pedicels not longer than the flowers;* lip triangular-halberd-shaped, long-pointed. — Cold wet swamps, N. New England to Pennsylvania, Wisconsin, and northward. July. (Eu.)

2. **M. ophioglossoìdes,** Nutt. Leaf solitary near the middle of the stem, ovate, clasping; *raceme short and obtuse; pedicels much longer than the flowers;* lip obtusely auricled at the base, 3-toothed at the summit. — Damp woods; more common southward. — Plant 4'–10' high. July.

14. LÍPARIS, Richard. TWAYBLADE.

Sepals and petals nearly equal, linear, or the latter thread-like, spreading. Lip flat, entire, often bearing 2 tubercles above the base. Column elongated, incurved, margined at the apex. Anther, &c. as in the last. — Small herbs, with solid bulbs, producing 2 root-leaves and a low scape, which bears a raceme of few purplish or greenish flowers. (Name from λιπαρός, *fat* or *shining*, in allusion to the smooth or unctuous leaves.)

1. **L. liliifòlia,** Richard. Leaves 2, ovate; petals thread-like, reflexed; *lip large* ($\frac{1}{2}$' long), *wedge-obovate, abruptly short-pointed, brown-purplish.* (Malaxis liliifolia, *Swartz.*) — Moist woodlands: commonest in the Middle States. June.

2. **L. Lœsèlii,** Richard. Leaves 2, elliptical-lanceolate or oblong, sharply keeled; *lip obovate or oblong* (2'' long), mucronate at the incurved tip, *yellowish-green, shorter than the linear unequal petals and sepals.* (Malaxis Correana, *Barton.*) — Bogs and wet meadows, New England to Penn., Wisconsin, and northward: rare. June. (Eu.)

15. CORALLORHÌZA, Haller. CORAL-ROOT.

Flower ringent; the oblong or lanceolate sepals and petals nearly alike, the lateral ascending and the upper arching: lip spreading above, with 2 projecting ridges or lamellæ on the face below, slightly adherent at the base to the 2-edged straightish column, and often more or less extended into a protuberance or short spur coalescent with the summit of the ovary. Anther 2-lipped, terminal and lid-like. Pollen-masses 4, obliquely incumbent, soft-waxy or powdery, free. — Brownish or yellowish herbs, destitute of green foliage, with much-branched and toothed coral-like root-stocks (probably root-parasitical), sending up a simple scape, furnished with sheaths in place of leaves, and bearing small and dull-colored flowers in a spiked raceme. (Name composed of κοράλλιον, *coral*, and ῥίζα, *root*.)

* *Lip 3-lobed (the middle lobe very much largest) and with 2 distinct lamellæ or plaited ridges on the face, whitish, usually spotted or mottled with crimson.*

1. **C. innàta,** R. Brown. Plant slender, light brownish or yellowish (5′–9′ high), 5–12-flowered; *lip somewhat hastately 3-lobed above the base,* the lamellæ thick and rather short; *spur none;* pod oval or elliptical (3″–4″ long). (C. verna, *Nutt.*) — Swamps and damp woods, throughout; but scarce. May, June. (Eu.)

2. **C. multiflòra,** Nutt. Plant purplish, rather stout (9′–18′ high), 10–30-flowered; *lip deeply 3-lobed at the base;* the middle lobe very wavy, recurved, the lamellæ occupying a great part of its length; *spur a manifest protuberance;* pod oblong (⅔′–¾′ long). — Dry rich woods; common, especially northward. July–Sept. — Flower much larger than in the last: sepals and petals 3″–4″ long.

* * *Lip not at all lobed (mostly purplish, but unspotted); the lamellæ consisting of short and tooth-like processes near the base.*

3. **C. odontorhìza,** Nutt. Plant light brown or purplish; stem rather slender, bulbous-thickened at the base (6′–16′ high), 6–20-flowered; *flowers small, on rather slender pedicels; lip* (2″–3″ long) *obovate or ovate* with a short narrowed base, flattish, with the margin *wavy and obscurely denticulate;* spur obsolete; pod oval (3″–5″ long). (C. Wistariana, *Conrad,* is merely a larger form.) — Rich woods, W. New England and New York to Michigan and southward; common. May–Aug. — Flowers intermediate in size between No. 1 and No. 2. There is a small tooth, more or less evident, on each side, where the base of the lip and the wing-like margin of the column join.

4. **C. Macræi,** Gray. Plant purplish, stout (6′–16′ high), bearing 15–20 *large flowers in a crowded spike, on very short pedicels; lip oval, very obtuse,* rather fleshy (purple), 3-nerved, perfectly *entire,* concave, the margins incurved, the sessile base obscurely auricled and with 1–3 short lamellæ; spur none at all; pod ovoid (½′ long). — Woods, along Lakes Huron and Superior (Mackinaw, *C. G. Loring, Jr., Whitney,* &c., West Canada, *W. F. Macrae.*) — Sepals and petals 6″–8″ long, conspicuously 3-nerved; but this cannot be C. striata, *Lindl.,* which is said to have a 3-lobed and acute lip, &c. Flowers the largest of the genus.

16. APLÉCTRUM, Nutt. PUTTY-ROOT. ADAM-AND-EVE.

Sepals and petals much as in the last. Lip with a short claw, free, 3-lobed, the palate 3-ridged; no trace of a spur. Anther slightly below the apex of the cylindrical straightish column: pollen-masses 4. — Scape and raceme as in Corallorhiza, invested below with 3 greenish sheaths, springing in May from the side of a thick globular solid bulb or corm (filled with exceedingly glutinous matter), which also produces from its apex, late in the preceding summer, a large, oval, many-nerved and plaited, petioled, green leaf, lasting through the winter. (Genus too near the last? The name composed of *a* privative and πλῆκτρον, *a spur,* from the total want of the latter.)

1. **A. hyemàle,** Nutt. — Woods, in rich mould: rare. — Solid bulbs often 1′ in diameter, one produced annually on a slender stalk, along with fibrous

roots, generally lasting until the third year before it shrivels, so that 2–3 or more are found, horizontally connected. Scape 1° high. Flowers dingy greenish-brown and purple; the lip whitish and speckled, nearly ½' long.

17. CYPRIPÈDIUM, L. LADY'S SLIPPER.

Sepals spreading; the 2 anterior distinct, or commonly united into one under the lip. Petals similar but usually narrower, spreading. Lip a large inflated sac, somewhat slipper-shaped. Column short, 3-lobed; the lateral lobes bearing a 2-celled anther under each of them, the middle lobe (sterile stamen) dilated and petal-like, thickish, incurved. Pollen pulpy-granular. Stigma terminal, obscurely 3-lobed. — Root of many tufted fibres. Leaves large, many-nerved and plaited, sheathing at the base. Flowers solitary or few, large and showy. (Name composed of Κύπρις, *Venus*, and πόδιον, *a sock* or *buskin*, i. e. *Venus's Slipper*.) Also called MOCCASON-FLOWER.

§ 1. *Stem leafy, 1–3-flowered: sepals and the linear wavy-twisted petals longer than the lip, pointed, greenish shaded with purplish-brown; the 2 anterior sepals united into one quite or nearly to the tip.*

1. **C. pubéscens**, Willd. (LARGER YELLOW LADY'S SLIPPER.) *Sepals elongated-lanceolate; lip flattened laterally*, very convex and gibbous above, *pale yellow*; sterile stamen (appendage of the column) triangular. — Bogs and damp low woods; common northward and westward, and southward in the Alleghanies. May, June. — Stem 2° high, pubescent, as are the broadly oval acute leaves. Flower scentless. Lip 1½'–2' long.

2. **C. parviflòrum**, Salisb. (SMALLER YELLOW LADY'S SLIPPER.) *Sepals ovate or ovate-lanceolate; lip flattish from above, bright yellow*; sterile stamen triangular; leaves oval, pointed. — Rich low woods; rather common. May, June. — Stem 1°–2° high. Flower fragrant: perianth more brown-purple than the last: lower sepal often narrower than the upper, frequently cleft at the apex. Lip ¾'–1' long.

3. **C. cándidum**, Muhl. (SMALL WHITE LADY'S SLIPPER.) *Sepals ovate-lanceolate; lip* flattish laterally, convex above, *white; sterile stamen lanceolate*; leaves lance-oblong, acute. — Low grounds, W. Penn. to Kentucky, Wisconsin, and northwestward. — Plant 5'–10' high, slightly pubescent, 1-flowered. Petals and sepals greenish, nearly equal in length, not much longer than the lip, which is ¾' long.

§ 2. *Stem very leafy, 1–3-flowered: sepals and petals flat and rounded, white, not longer than the lip, the 2 anterior sepals perfectly united into one.*

4. **C. spectábile**, Swartz. (SHOWY LADY'S SLIPPER.) Sepals round-ovate or the upper orbicular, rather longer than the oblong petals; *lip much inflated, white tinged with purple* in front; sterile stamen heart-ovate. — Peat-bogs, Maine and W. New England to Wisconsin; common northward, and southward along the Alleghanies. July. — The most beautiful of the genus, downy, 2° high. Leaves ovate, pointed. Lip fully 1½' in diameter, sometimes almost all purple.

§ 3. *Scape naked, 2-leaved at the base, 1-flowered; sepals and petals greenish, shorter than the lip, the 2 anterior perfectly united into one.*

5. **C. acaule,** Ait. (STEMLESS LADY'S SLIPPER.) Sepals oblong-lanceolate, pointed, nearly as long as the linear petals; lip drooping, obovoid, rose-purple, with a fissure in front; sterile stamen rhomboid, pointed; leaves oblong. (C. hùmile, *Salisb.*) — Dry or moist woods, under evergreens; common, especially northward. May, June. — Plant downy: the scape 8′-12′ high, with a green bract at the top. Lip nearly 2′ long, veiny, sometimes pale, or even white.

§ 4. *Stem leafy, 1-flowered: the 2 anterior sepals separate.*

6. **C. arietinum,** R. Brown. (RAM'S-HEAD.) Upper sepal ovate-lanceolate, pointed; the 2 lower and the petals linear and nearly alike, rather longer than the red and white veiny lip, which is prolonged at the apex into a short conical deflexed point; sterile stamen rounded; leaves 3 or 4, elliptical-lanceolate, nearly smooth. (Cryosánthes, *Raf.* Arietìnum, *Beck.*) — Swamps and damp woods, Maine and Vermont to Wisconsin, and northward: rare. June. — Stem slender, 6′-12′ high. Perianth greenish-brown: lip small, somewhat conical, hairy at the orifice, ½′ long.

ORDER 120. AMARYLLIDÀCEÆ. (AMARYLLIS FAMILY.)

Chiefly bulbous and scape-bearing herbs, not scurfy or woolly, with linear flat root-leaves, and regular (or nearly so) perfect 6-androus flowers, the tube of the corolline 6-parted perianth coherent with the 3-celled ovary, the lobes imbricated in the bud. — Anthers introrse. Style single. Pod 3-celled, several-many-seeded. Seeds anatropous or nearly so, with a straight embryo in the axis of fleshy albumen. — An order represented in our gardens by the *Narcissus* (N. POETICUS), *Jonquil* (N. JONQUILLA), and *Daffodil* (N. PSEUDO-NARCISSUS), the *Snowdrop* (GALANTHUS NIVALIS) and the *Snowflake* (LEUCOJUM VERNUM), &c., but with very few indigenous representatives in this country. Bulbs acrid. *Hypoxys* is the type of a small suborder?

Synopsis.

* Pod 3-valved, loculicidal: anthers versatile: perianth funnel-shaped.

1. AMARYLLIS. Flower naked in the throat; the tube short or none. Bulbs coated.
2. PANCRATIUM. Flower with a slender tube and narrow recurved lobes; a cup-shaped crown connecting the stamens. Bulbs coated.
3. AGAVE. Flower equally 6-cleft, persistent: no crown. Fleshy-leaved, not bulbous.

* * Pod indehiscent: anthers erect.

4. HYPOXYS. Perianth 6-parted nearly down to the ovary. Bulb solid.

1. AMARÝLLIS, L. § ZEPHYRÁNTHES, Herb. AMARYLLIS.

Perianth funnel-form, from a tubular base; the 6 divisions petal-like and similar, spreading above; the 6 stamens inserted in its naked throat: anthers versatile. Pod membranaceous, 3-lobed. — Leaves and scape from a coated bulb Flowers 1 or 2, from a 1 - 2-leaved spathe. (A poetical name.)

1. **A. Atamásco,** L. (Atamasco Lily.) Spathe 2-cleft at the apex; perianth white and pink; stamens and style declined. — Penn. (*Muhl.*) Virginia, and southward. June. — Flower 3′ long, on a scape 6′ high.

2. PANCRÀTIUM, L. Pancratium.

Perianth with a long and slender tube, and an equal 6-parted limb; the lobes long and narrow, recurved: the throat bearing a tubular or cup-shaped corolline delicate crown, which connects the bases of the 6 exserted stamens. Anthers linear, versatile. Pod thin, 2 - 3-lobed, with a few fleshy seeds, often like bulblets. — Scapes and leaves from a coated bulb. Flowers large and showy in an umbel-like head or cluster, leafy-bracted. (Name composed of πᾶν, *all*, and κρατύς, *powerful*, from fancied medicinal properties.)

1. **P. rotàtum,** Ker. Leaves ascending, strap-shaped (1° - 2° long); scape few-flowered; the handsome (white and fragrant) flower with a spreading large 12-toothed crown, the alternate teeth bearing the filaments. (Hymenocállis rotata, &c., *Herbert.*) — Marshy banks of streams, Kentucky, Virginia, and southward. May. — Flowers opening at night or in cloudy weather.

3. AGÀVE, L. American Aloe.

Perianth tubular-funnel-form, persistent, 6-parted; the divisions nearly equal, narrow. Stamens 6, soon exserted: anthers linear, versatile. Pod coriaceous, many-seeded. Seeds flattened. — Leaves very thick and fleshy, often with cartilaginous or spiny teeth, clustered at the base of the many-flowered scape, from a thick fibrous-rooted crown. (Name altered from ἀγαυός, *wonderful*, not inappropriate as applied to A. Americana, the *Century-plant.*)

1. **A. Virgínica,** L. (False Aloe.) Herbaceous; scape simple (3° - 6° high); the flowers scattered in a loose wand-like spike, greenish-yellow, very fragrant. — Dry or rocky banks, Penn.? Kentucky, Virginia, and southward. Sept.

4. HYPÓXYS, L. Star-grass.

Perianth persistent, 6-parted, spreading; the 3 outer divisions a little herbaceous outside. Stamens 6: anthers erect. Pod crowned with the withered or closed perianth, not opening by valves. Seeds globular, with a crustaceous coat, ascending, imperfectly anatropous, the rhaphe not adherent quite down to the micropyle, the seed-stalk thus forming a sort of lateral beak. Radicle inferior! — Stemless small herbs, with grassy and hairy linear leaves and slender few-flowered scapes from a solid bulb. (Name composed of ὑπό, *beneath*, and ὀξύς, *sharp*, it is thought because the pod is acute at the base.)

1. **H. erécta,** L. Leaves linear, grass-like, longer than the umbellately 1 - 4-flowered scape; divisions of the perianth hairy and greenish outside, yellow within. — Meadows and open woods; common. June - Aug.

ORDER 121. HÆMODORÀCEÆ. (BLOODWORT FAMILY.)

Herbs, with fibrous roots, usually equitant leaves, and perfect 3–6-androus regular flowers, which are woolly or scurfy outside; the tube of the 6-lobed perianth coherent with the whole surface, or with merely the lower part, of the 3-celled ovary. — Anthers introrse. Style single, sometimes 3-partible; the 3 stigmas alternate with the cells of the ovary. Pod crowned or enclosed by the persistent perianth, 3-celled, loculicidal, 3–many-seeded. Embryo small, in hard or fleshy albumen. A small family.*

Synopsis.

* Ovary wholly adherent to the calyx-tube: style filiform: seeds peltate, amphitropous.

1. LACHNANTHES. Stamens 3, exserted: anthers versatile. Leaves equitant.

* * Ovary free except the base: style 3-partible: seeds anatropous.

2. LOPHIOLA. Stamens 6, inserted near the base of the woolly 6-cleft perianth. Leaves equitant.

3. ALETRIS. Stamens 6, inserted in the throat of the warty-roughened and tubular 6-toothed perianth. Leaves flat.

1. LACHNÁNTHES, Ell. RED-ROOT.

Perianth woolly outside, 6-parted down to the adherent ovary. Stamens 3, opposite the 3 larger or inner divisions: filaments long, exserted: anthers linear, fixed by the middle. Style thread-like, exserted, declined. Pod globular. Seeds few on each fleshy placenta, flat and rounded, fixed by the middle. — Herb with a red fibrous perennial root, equitant sword-shaped leaves, clustered at the base and scattered on the stem, which is hairy at the top, and terminated by a dense compound cyme of dingy yellow and loosely woolly flowers (whence the name, from λάχνη, *wool*, and ἄνθος, *blossom*).

1. **L. tinctòria,** Ell. — Sandy swamps, Rhode Island, New Jersey, and southward, near the coast. July – Sept.*

2. LOPHÌOLA, Ker. LOPHIOLA.

Perianth densely woolly, deeply 6-cleft; the divisions nearly equal, spreading, longer than the 6 stamens, which are inserted at their base. Anthers fixed by the base. Pod ovate, free from the perianth except at the base, pointed with the awl-shaped style, which finally splits into 3 divisions, one terminating each valve. Seeds numerous, oblong, ribbed, anatropous. — A slender perennial herb, with creeping rootstocks and fibrous roots, linear and nearly smooth equitant leaves; the stem leafless and whitened with soft matted wool towards the summit, as well as the crowded or panicled cyme. Perianth dingy yellow inside; the lobes naked only towards the tip, each clothed with a woolly tuft towards the base (whence the name, from λοφεῖον, *a small crest*).

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* The character by which Endlicher distinguishes this family from the foregoing, viz. by having the 3 cells of the ovary *opposite the inner divisions of the perianth*, is not true of either of the following genera. Yet, in *Lophiola* and *Aletris*, the 3 stigmas, as well as the 3 divisions into which the style splits at maturity, are indeed thus situated: but they stand over the *partitions*, instead of the cells, and therefore exactly surmount the valves of the loculicidal pod.

1. **L. aùrea,** Ker. (Conóstylis Americana, *Pursh.*) — Boggy pine barrens, New Jersey to Virginia, and southward. June - Aug.

3. ÁLETRIS, L. COLIC-ROOT. STAR-GRASS.

Perianth cylindrical, not woolly, but wrinkled and roughened outside by thickly-set points, which look like scurfy mealiness, the tube cohering below with the base only of the ovary, 6-cleft at the summit. Stamens 6, inserted at the base of the lobes: filaments and anthers short, included. Style awl-shaped, 3-cleft at the apex: stigmas minutely 2-lobed. Pod ovate, enclosed in the roughened perianth; the dehiscence, seeds, &c. nearly as in Lophiola. — Perennial and smooth stemless herbs, very bitter, with fibrous roots, and a spreading cluster of thin and flat lanceolate leaves; the small flowers in a wand-like spiked raceme, terminating a naked slender scape (2° - 3° high). Bracts awl-shaped, minute. (Ἀλετρίς, a female slave who grinds corn; the name applied to these plants, in allusion to the apparent mealiness dusted over the blossoms.)

1. **A. farinòsa,** L. Flowers oblong-tubular, white; lobes lanceolate-oblong. — Grassy or sandy woods; common, especially southward. July, Aug.

2. **A. aùrea,** Walt. Flowers bell-shaped, yellow (fewer and shorter); lobes short-ovate. — Barrens, &c., N. Jersey to Virginia, and southward.

ORDER 122. BROMELIÀCEÆ. (PINE-APPLE FAMILY.)

Herbs (or scarcely woody plants, nearly all tropical), the greater part epiphytes, with persistent dry or fleshy and channelled crowded leaves, sheathing at the base, usually covered with scurf; 6-androus; the 6-cleft perianth adherent to the ovary in the *Pine-apple*, &c., or free from it in our only representative, viz.

1. TILLÁNDSIA, L. LONG MOSS.

Perianth plainly double, 6-parted; the 3 outer divisions (sepals) membranaceous; the 3 inner (petals) colored; all convolute below into a tube, spreading above, lanceolate. Stamens 6, hypogynous! or the alternate ones cohering with the base of the petals: anthers introrse. Ovary free: style thread-shaped: stigmas 3. Pod cartilaginous, 3-celled, loculicidally 3-valved; the valves splitting into an inner and an outer layer. Seeds several or many in each cell, anatropous, club-shaped, pointed, raised on a long hairy-tufted stalk, like a coma. Embryo small, at the base of copious albumen. — Scurfy-leaved epiphytes. (Named for *Prof. Tillands* of Abo.)

1. **T. usneoìdes,** L. (COMMON LONG MOSS OR BLACK MOSS.) Stems thread-shaped, branching, pendulous; leaves thread-shaped; peduncle short, 1-flowered. — Dismal Swamp, Virginia, and southward; growing on the branches of trees, forming long hanging tufts. A characteristic plant of the Southern States, and barely coming within the limits of this work.

ORDER 123. IRIDÀCEÆ. (IRIS FAMILY.)

Herbs, with equitant 2-ranked leaves, and regular or irregular perfect flowers; the divisions of the 6-cleft petal-like perianth convolute in the bud in 2 sets, the tube coherent with the 3-celled ovary, and 3 distinct or monadelphous stamens with extrorse anthers. — Flowers from a 2-leaved spathe, usually showy and ephemeral. Style single: stigmas 3, alternate with the cells of the ovary. Pod 3-celled, loculicidal, many-seeded. Seeds anatropous: embryo straight in fleshy albumen. Rootstocks, tubers, &c. mostly acrid. — A rather small family, here represented by only two genera.

1. ÌRIS, L. FLOWER-DE-LUCE.

Perianth 6-cleft; the 3 outer divisions spreading or reflexed; the 3 inner smaller and erect. Stamens distinct, placed before the outer divisions of the perianth, and under the 3 petal-like stigmas. Pod 3-6-angled. Seeds depressed-flattened. — Perennials with creeping and often tuberous rootstocks, sword-shaped or grassy leaves, and large showy flowers. (Ἶρις, the *rainbow deified*, anciently applied to this genus on account of the bright and varied colors of the blossoms.)

* *Stems leafy* (1°-3° *high*), *often branching: rootstocks thick: flowers crestless, the inner divisions* (*petals*) *much smaller than the outer.*

1. **I. versícolor,** L. (LARGER BLUE FLAG.) Stem stout, angled on one side; *leaves sword-shaped* (¾' wide); ovary obtusely triangular with the sides flat; pod oblong, turgid, with rounded angles. — Wet places; common. May, June. — Flowers blue, variegated with green, yellow and white at the base, and veined with purple.

2. **I. Virgínica,** L. (SLENDER BLUE FLAG.) Stem very slender, terete; *leaves narrowly linear* (¼' wide); ovary 3-angled, and each side deeply 2-grooved; pod triangular, acute at both ends. (I. prismatica, *Pursh.* I. gracilis, *Bigel.*) — Marshes, Maine to Virginia, and southward, near the coast. June. — Flower much smaller than in the last.

* * *Low, almost stemless,* 1-3-*flowered: divisions of the light blue-purple perianth nearly equal: rootstocks slender, and here and there tuberous-thickened, creeping and tufted.*

3. **I. vérna,** L. (DWARF IRIS.) *Leaves linear,* grass-like, rather glaucous, the thread-like tube of the perianth about the length of the divisions, which are all *beardless and crestless;* pod triangular. — Wooded hill-sides, Virginia, Kentucky, and southward. April.

4. **I. cristàta,** Ait. (CRESTED DWARF IRIS.) *Leaves lanceolate* (3'-5' long when grown); those of the spathe ovate-lanceolate, shorter than the *thread-like tube of the perianth,* which is 2' long and *considerably exceeds the divisions;* the outer ones *crested, but beardless;* pod sharply triangular. — Mountains of Virginia, Kentucky, and southward. May.

5. **I. lacústris,** Nutt. (LAKE DWARF IRIS.) *Tube of the perianth rather shorter than the divisions* (yellowish, ½'-¾' long), *dilated upwards,* not exceeding

the spathe: otherwise much as in the last. — Gravelly shores of Lakes Huron and Michigan. May.

I. PÙMILA, L., the DWARF IRIS of the Old World, and I. SAMBUCÌNA, L., the common FLOWER-DE-LUCE (i. e. *Fleur-de-Lis*), are familiar in gardens.

2. SISYRÍNCHIUM, L. BLUE-EYED GRASS.

Perianth 6-parted; the divisions alike, spreading. Stamens monadelphous. Stigmas involute-thread-like. Pod globular-3-angled. Seeds globular. — Low slender perennials, with fibrous roots, grassy or lanceolate leaves, mostly branching 2-edged or winged stems, and fugacious umbelled-clustered small flowers from a 2-leaved spathe. (Name composed of *σῦς*, *a hog*, and *ῥύγχος*, *snout*, from a fancy that the hogs are fond of rooting it up.)

1. **S. Bermudiàna,** L. Scape winged, naked, or 1-2-leaved; leaves narrow and grass-like; divisions of the perianth obovate, more or less notched at the end, and bristle-pointed from the notch. (Leaves of the spathe almost equal, shorter than the flowers.) — Var. ÁNCEPS (S. anceps, *Cav.*) has a broadly winged scape, and the outer leaf of the very unequal spathe longer than the flowers. — Var. MUCRONÀTUM (S. mucronatum, *Michx.*) has a slender and narrowly winged scape, very narrow leaves, those of the spathe sharp-pointed, unequal, one of them usually longer than the flowers. But there are various intermediate forms. — Moist meadows, &c., among grass; common everywhere. June - Aug. — Flowers small, delicate blue, changing to purplish, rarely whitish, 4-6 opening in succession.

THE CROCUS, the CORN-FLAG (GLADÌOLUS), the BLACKBERRY LILY (PARDÁNTHUS CHINÉNSIS), and the TIGER-FLOWER (TIGRÍDIA PAVÒNIA), are common cultivated plants of the family.

ORDER 124. DIOSCOREÀCEÆ. (YAM FAMILY.)

Plants with twining stems from large tuberous roots or knotted rootstocks, and ribbed and netted-veined petioled leaves, small diœcious 6-androus and regular flowers, with the 6-cleft calyx-like perianth adherent in the fertile plant to the 3-celled ovary. Styles 3, *distinct.* — Ovules 1 or 2 in each cell, anatropous. Fruit usually a membranaceous 3-angled or winged pod. Seeds with a minute embryo in hard albumen. — Represented chiefly by the genus

1. DIOSCORÈA, Plumier. YAM.

Flowers very small, in axillary panicles or racemes. Stamens 6, at the base of the divisions of the 6-parted perianth. Pod 3-celled, 3-winged, loculicidally 3-valved by splitting through the winged angles. Seeds 1 or 2 in each cell, flat, with a membranaceous wing. (Dedicated to the Greek naturalist *Dioscorides*.)

1. **D. villòsa,** L. (WILD YAM-ROOT.) Herbaceous; leaves mostly alternate, sometimes nearly opposite or in fours, more or less downy under-

neath, heart-shaped, conspicuously pointed, 9 – 11-ribbed; flowers pale greenish-yellow, the sterile in drooping panicles, the fertile in drooping simple racemes. — Thickets, New England to Wisconsin, and common southward. July. — A slender vine, from knotty and matted rootstocks, twining over bushes. Pods $\frac{3}{4}$′ long. — A bad name, for the plant is never villous, and often nearly smooth.

ORDER 125. SMILÀCEÆ. (SMILAX FAMILY.)

Herbs, or climbing shrubby plants, with ribbed and conspicuously netted-veiny leaves, regular 6 – 10-*androus flowers with the* 6 – 10-*leaved perianth free from the* 3 – 5-*celled* (*rarely* 1 – 2-*celled*) *ovary; the styles or sessile stigmas as many and distinct. Anthers introrse.* Fruit a few-several-seeded berry. Embryo minute, in hard albumen. — A group with no known and clear marks of distinction from the next: as here received it comprises two marked suborders, viz.: —

SUBORDER I. EUSMILACEÆ. THE TRUE SMILAX FAMILY.

Flowers diœcious, axillary; the 6 divisions of the perianth all alike. Anthers 1-celled (2-locellate). Styles nearly wanting: stigmas 2 – 3. Seeds orthotropous, pendulous. — Chiefly shrubby and alternate-leaved.

1. **SMILAX.** Perianth of 6 distinct and similar divisions. Ovules solitary, rarely 2 in each cell.

SUBORDER II. TRILLIACEÆ. THE TRILLIUM FAMILY.

Flowers perfect, terminal: the sepals and petals usually different in color. Anthers 2-celled. Styles manifest. Seeds anatropous, several in each cell. Herbs: leaves whorled.

2. **TRILLIUM.** Sepals 3, green, persistent. Petals 3. Flower single.
3. **MEDEOLA.** Sepals and petals 3, colored alike, deciduous. Flowers umbelled.

SUBORDER I. EUSMILÀCEÆ. THE TRUE SMILAX FAMILY.

1. SMÌLAX, Tourn. GREENBRIER. CATBRIER.

Flowers diœcious. Perianth of 6 (rarely 5 or 7) equal spreading sepals (greenish or yellowish), deciduous. *Ster. Fl.* Stamens as many as the sepals, and at their base: filaments linear: anthers linear or oblong, fixed by the base. *Fert. Fl.* Filaments, if present, sterile. Stigmas thick and spreading, almost sessile. Berry globular, 1 – 3-celled, 1 – 6-seeded. Seeds orthotropous, suspended, globular. Albumen horny. — Shrubs, or rarely perennial herbs, often evergreen and prickly, climbing by a pair of tendrils on the petioles, with yellowish-green stems, variously shaped simple leaves, and small flowers in axillary peduncled umbels. (The ancient Greek name, of obscure meaning.)

§ 1. SMILAX PROPER. — *Stems woody, often prickly: ovules and seeds solitary in each cell.* (*All our species are glabrous.*)

* *Leaves ovate or roundish, &c., most of them roundish or heart-shaped at the base, 5–9-nerved, the three middle nerves or ribs stronger and more conspicuous.*

+ *Peduncles shorter or scarcely longer than the petioles: leaves thickish, inclining to be evergreen, at least southward, green both sides.*

1. **S. Wálteri,** Pursh. Branches somewhat angled, prickly or unarmed; *leaves ovate and somewhat heart-shaped* (3′–4½′ long); *berries red.* (S. China, *Walt.*) — S. E. Virginia and southward. July.

2. **S. rotundifòlia,** L. (COMMON GREENBRIER.) Stem armed with scattered prickles, as well as the terete branches; branchlets more or less 4-angular; *leaves ovate or round-ovate*, often broader than long, slightly heart-shaped, abruptly short-pointed (2′–3′ long); *berries blue-black*, with a bloom. (S. caduca, *L.*, is only a more deciduous and thin-leaved form.) — Moist thickets; common, especially southward. June. — Plant yellowish-green, often high-climbing. — Passes into var. QUADRANGULÀRIS; the branches, and especially the branchlets, 4-angular, often square. (S. quadrangularis, *Muhl.*) — Penn. to Kentucky and southward.

+ + *Peduncles longer than, but seldom twice the length of the petiole: leaves tardily deciduous or partly persistent: berries black, with a bloom.*

3. **S. glaùca,** Walt. Terete branches and somewhat 4-angular branchlets armed with scattered stout prickles, or naked; *leaves ovate*, rarely subcordate, *glaucous beneath* and sometimes also above as well as the branchlets when young (about 2′ long), abruptly mucronate, the edges smooth and naked. (S. Sarsaparilla, *L.*, in part, but not as to syn. Bauhin, whence the name was taken. S. caduca, *Willd.*, &c. S. spinulosa, *Smith? Torr. fl.*) — Dry thickets, &c., S. New York to Kentucky and southward. July.

4. **S. tamnoìdes,** L. Branches and the angular (often square) branchlets sparsely armed with short rigid prickles; *leaves* varying from round-heart-shaped and slightly contracted above the dilated base to fiddle-shaped and halberd-shaped-3-lobed, *green and shining both sides*, cuspidate-pointed, the margins often somewhat bristly-ciliate or spinulose. (S. Bona-nox, *L.*, S. hastata, *Willd.*, S. panduratus, *Pursh*, &c., are all forms of this.) — Thickets, New Jersey to Illinois, and (chiefly) southward. July.

+ + + *Peduncles 2–4 times the length of the petiole: leaves ample (3′–5′ long), thin or thinnish, green both sides: berries black: stem terete and branchlets nearly so.*

5. **S. híspida,** Muhl. Rootstock cylindrical, elongated; stem (climbing high) below densely *beset with long and weak blackish bristly prickles*, the flowering branchlets mostly naked; *leaves* ovate and the larger heart-shaped, pointed, slightly rough-margined, *membranaceous and deciduous.* — Moist thickets, Penn. and W. New York to Michigan. June. — Peduncles 1½′–2′ long. Sepals lanceolate, almost 3″ long.

6. **S. Pseudo-China,** L. *Rootstock tuberous; stems and branches unarmed*, or with very few weak prickles; leaves ovate-heart-shaped, or on the branchlets ovate-oblong, cuspidate-pointed, often rough-ciliate, becoming firm in texture; peduncles flat (1½′–3′ long). — Dry or sandy soil, New Jersey to Kentucky, and southward. July.

* * *Leaves varying from oblong-lanceolate to linear, narrowed at the base into a short petiole, 3 – 5-nerved, shining above, paler or glaucous beneath, many without tendrils; peduncles short, seldom exceeding the pedicels; the umbels sometimes panicled; branches terete, unarmed.*

7. **S. lanceolàta,** L. *Leaves thin,* rather deciduous, ovate-lanceolate or lance-oblong; *berries red.* — S. E. Virginia and southward. June.

8. **S. laurifòlia,** L. *Leaves thick and coriaceous, evergreen,* varying from oblong-lanceolate to linear (2½′ – 5′ long); *berries black,* mostly 1-seeded. — Pine barrens, New Jersey to Virginia and southward. July, Aug.

§ 2. COPROSMÁNTHUS, Torr. — *Stem herbaceous, not prickly: ovules mostly in pairs in each cell: leaves long-petioled, membranaceous, mucronate-tipped: berries bluish-black with a bloom.*

9. **S. herbàcea,** L. (CARRION-FLOWER.) Stem erect and recurving, or climbing; *leaves ovate-oblong or rounded, mostly heart-shaped, 7 – 9-nerved,* smooth; tendrils sometimes wanting; peduncles elongated (3′ – 4′ long, or often 6′ – 8′, and much longer than the leaves), 20 – 40-flowered. — Var. PULVERULÉNTA (S. pulverulenta, *Michx.* & S. peduncularis, *Muhl.*) has the leaves more or less soft-downy underneath. A shorter peduncled state of this is S. lasioneuron, *Hook.* — Moist meadows and river-banks; common. June. — Stem 3° – 6° long. Leaves very variable: petioles 1′ – 3′ long. Flowers exhaling the stench of carrion. Seeds 6.

10. **S. tamnifòlia,** Michx. Stem upright or climbing; *leaves heart-halberd-shaped, 5-nerved,* smooth; peduncles longer than the petioles. (S. tamnoides, *Pursh.,* not of *L.*) — Pine barrens, New Jersey to Virginia and southward. — Leaves abruptly narrowed above the dilated heart-shaped base, tapering to the apex. Berry (always?) 2 – 3-seeded.

SUBORDER II. TRILLIÀCEÆ. THE TRILLIUM FAMILY.

2. TRÍLLIUM, L. THREE-LEAVED NIGHTSHADE.

Flower perfect. Sepals 3, lanceolate, spreading, herbaceous, persistent. Petals 3, larger, withering in age. Stamens 6: anthers linear, adnate, on short filaments. Styles (or rather stigmas) awl-shaped or slender, spreading or recurved above, persistent, stigmatic down the inner side. Berry often 6-sided, ovate, 3-celled (purple). Seeds horizontal, several in each cell. — Low perennial herbs, with a stout and simple stem rising from a very short and abrupt tuber-like rootstock, naked below, bearing at the summit a whorl of 3 ample and commonly broadly ovate leaves, and a terminal large flower. (Name from *trilix,* triple; all the parts being in threes.) — Monstrosities are not rarely met with in some species, especially in Nos. 5 and 7, with the calyx and sometimes the petals changed to leaves, or with the parts of the flower increased in number.

§ 1. *Flower sessile and involucrate by the 3 leaves, erect; petals varying from spatulate to lanceolate, 1′ – 2′ long, little exceeding the sepals, withering-persistent: stems mostly two from the same bud.*

1. **T. séssile,** L. *Leaves also sessile, ovate* or rhomboidal, acute, often blotched or spotted; *sessile petals erect-spreading* (dark and dull purple, varying to greenish). — Moist woods, Penn. to Wisconsin, and southward. April, May. — Stem 4′ - 12′ high.

2. **T. recurvàtum,** Beck. *Leaves contracted at the base into a petiole, ovate, oblong, or obovate; sepals reflexed, petals* pointed at both ends, *unguiculate,* dark purple. — Wisconsin, Illinois, Kentucky, and southward. April.

§ 2. *Flower raised on a peduncle: petals withering away soon after blossoming.*

* *Short peduncle recurved under the leaves: rootstocks clustered, bearing 2 - 3 stems.*

3. **T. cérnuum,** L. (Nodding Trillium or Wake-Robin.) Leaves broadly rhomboid, pointed, nearly sessile; *petals white, oblong-ovate, pointed, recurved, wavy,* rather longer than the sepals. — Moist woods, N. England to Virginia, Kentucky, and southward; common eastward. May. — Petals ¾′ - 1′ long.

* * *Peduncle erect or at length nodding: rootstocks bearing a single stem.*

+- *Leaves sessile, abruptly taper-pointed.*

4. **T. eréctum,** L. (Purple Trillium. Birthroot.) *Leaves dilated-rhomboidal, nearly as broad as long,* very abruptly pointed; *petals ovate, acutish, dark dull purple, spreading,* little longer than the sepals (1′ - 1½′ long). (T. rhomboideum, var. atropurpureum, *Michx.*) — Rich woods; common northward, especially westward, and along the Alleghanies. May. — Peduncle 1′ - 3′ long, at length inclined.

Var. **álbum,** Pursh. *Petals greenish-white,* or rarely yellowish; ovary mostly dull-purple. (T. péndulum, *Ait.*, &c.) — With the purple-flowered form, especially from New York westward.

5. **T. grandiflòrum,** Salisb. (Large White Trillium.) *Leaves rhomboid-obovate, longer than broad,* more taper-pointed, barely sessile; *petals obovate,* spreading from an erect base, longer and much broader than the sepals (2′ - 2½′ long), *white, changing with age to rose-color.* — Rich woods, Vermont to Wisconsin and Kentucky, and northward. June. — Flower on a peduncle 2′ - 3′ long, very handsome.

+- +- *Leaves petioled, rounded at the base.*

6. **T. nivàle,** Riddell. (Dwarf White Trillium.) Small (2′ - 3′ high); *leaves oval or ovate, obtuse; petals oval-lanceolate, obtuse,* rather wavy, *white,* as long as the peduncle, longer than the sepals. — Rich woods, Ohio to Wisconsin. April. — Leaves 1′ - 2′, and petals 1′, long. Styles long and thread-like.

7. **T. erythrocárpum,** Michx. (Painted Trillium.) *Leaves ovate, taper-pointed; petals ovate or oval-lanceolate, pointed,* wavy, widely spreading, *white painted with purple stripes at the base,* almost twice the length of the sepals, shorter than the peduncle. (T. pictum, *Pursh.*) — Cold damp woods and bogs, New England to Lake Superior and northward, and southward in the higher Alleghanies through Virginia. May, June.

3. MEDÈOLA, Gronov. INDIAN CUCUMBER-ROOT.

Flowers perfect. Perianth revolute, of 3 sepals and 3 petals which are oblong and alike (pale greenish-yellow), deciduous. Stamens 6: filaments thread-like, longer than the linear-oblong anthers, which are attached by their back near the base. Styles 3, recurved-diverging, long and thread-form (stigmatic along the upper side), deciduous. Berry spherical (dark purple), 3-celled, few-seeded. — A perennial herb, with a simple slender stem (1°–3° high, clothed with flocculent deciduous wool) rising from a horizontal and tuberous white rootstock (which has the taste of the cucumber), bearing a whorl of 5 – 9 obovate-lanceolate and pointed sessile leaves near the middle, and another of 3 smaller ovate ones at the top, subtending a sessile umbel of small recurved flowers. (Named after the sorceress *Medea*, from the imaginary notion that it possesses great medicinal virtues.)

1. **M. Virgínica,** L. (Gyròmia, *Nutt.*) — Rich damp woods. June.

ORDER 126. LILIÀCEÆ. (LILY FAMILY.)

Herbs, with parallel-nerved sessile or sheathing leaves, regular perfect 6- (*rarely* 4-) *androus flowers with the petal-like consimilar 6-merous perianth free from the* 2 – 3*-celled ovary, introrse anthers attached by a point, and the style single.* — Stigmas 3, or combined into one. Fruit a 3-valved loculicidal pod, or a berry, many – few-seeded. Seeds anatropous or amphitropous. Embryo slender or minute, in fleshy or hard albumen.

Synopsis.

TRIBE I. **ASPARAGEÆ.** Fruit a few-seeded berry, 2 - 3-celled. Albumen horny. Not bulbous: rootstocks creeping or tuberous. Pedicels jointed under the flower.

* Stems branching, very leafy. Seeds amphitropous.

1. ASPARAGUS. Perianth 6-parted. Leaves thread-like or bristle-form. Pedicels jointed.

* * Stem simple, leafy.

2. POLYGONATUM. Perianth tubular, 6-cleft: stamens above the middle. Flowers axillary.
3. SMILACINA. Perianth 4 - 6-parted, spreading, he stamens borne at the base. Flowers in a raceme.

* * * Scape naked.

4. CONVALLARIA. Perianth bell-shaped, 6-lobed. Flowers in a simple raceme.
5. CLINTONIA. Perianth of 6 separate sepals. Stamens hypogynous. Flowers in an umbel.

TRIBE II. **ASPHODELEÆ.** Fruit a few - many-seeded pod, 3-celled. Seed-coat crustaceous, black.

* Not bulbous. Perianth united in a tube below.

6. HEMEROCALLIS. Perianth funnel-form. Stamens declined. Pod many-seeded.

* * Bulbous: scape simple. Perianth 6-sepalled or 6-parted.

7. ORNITHOGALUM. Flowers corymbed, never blue or reddish. Style 3-sided.
8. SCILLA. Flowers racemed, purple or blue Style thread-like.
9. ALLIUM. Flowers umbelled, from a spathe. Sepals 1-nerved.

TRIBE III. **TULIPACEÆ.** Fruit a many-seeded 3-celled pod. Seed-coat pale. Perianth 6-leaved.

* Bulbous herbs. Perianth deciduous.

10. LILIUM. Stem leafy. Pod oblong. Seeds vertically much flattened.
11. ERYTHRONIUM. Scape naked, 1-flowered. Pod obovate-triangular: seeds ovoid.

* * Not bulbous: stem (candex) perennial. Perianth not deciduous.

12. YUCCA Flowers in a terminal panicle. Leaves crowded, rigid and persistent.

1. ASPÁRAGUS, L. ASPARAGUS.

Perianth 6-parted, spreading above: the 6 stamens at their base. Style short: stigma 3-lobed. Berry spherical, 3-celled; the cells 2-seeded. — Perennials, with much-branched stems from thick and matted rootstocks, very narrow leaves in clusters, and small greenish-yellow axillary flowers. (The ancient Greek name.)

1. **A. OFFICINÀLIS**, L. (GARDEN ASPARAGUS.) Herbaceous; bushy-branched; leaves thread-like. — Sparingly escaped from gardens into waste places on the coast. June. (Adv. from Eu.)

2. POLYGONÀTUM, Tourn. SOLOMON'S SEAL.

Perianth tubular, 6-lobed at the summit; the 6 stamens inserted on or above the middle of the tube, included. Ovary 3-celled, with 2 – 6 ovules in each cell: style slender, deciduous by a joint: stigma obtuse or capitate, obscurely 3-lobed. Berry globular, black or blue; the cells 1 – 2-seeded. — Perennial herbs, with simple erect or curving stems, rising from creeping thick and knotted rootstocks, above bearing nearly sessile or half-clasping nerved leaves, and axillary nodding greenish flowers. (The ancient name, composed of πολύς, *many*, and γόνυ, *knee*, alluding to the numerous joints of the rootstocks and stems.) — Ours are all alternate-leaved species, and with the stem terete or scarcely angled when fresh.

1. **P. biflòrum**, Ell. (SMALLER SOLOMON'S SEAL.) Glabrous, except the ovate-oblong or lance-oblong *nearly sessile leaves*, which are commonly *minutely pubescent*, at least on the veins (but sometimes smooth), *as well as pale or glaucous underneath*; stem slender (1° – 3° high); *peduncles* 1 – 3- *but mostly 2-flowered*; *filaments papillose-roughened*, inserted towards the summit of the cylindrical-oblong perianth. (Convallaria biflora, *Walt.* C. pubescens, *Willd.* Polygonatum pubescens, angustifolium, & multiflorum, *Pursh.*) — Wooded banks; common. — Perianth ½′ long, greenish.

2. **P. gigánteum**, Dietrich. (GREAT SOLOMON'S SEAL.) *Glabrous throughout*; stem stout and tall (3° – 8° high), terete; *leaves ovate, partly clasping* (5′ – 8′ long), or the upper oblong and nearly sessile, many-nerved, *green both sides*; *peduncles several-* (2 – 8-) *flowered*; *filaments smooth and naked*, or nearly so, inserted on the middle of the tube of the cylindrical-oblong perianth. (Convallaria canaliculata, *Willd.* Polygonatum canaliculatum, *Pursh.* P. commutatum, *Dietrich.*) — River-banks and woods, in alluvial soil; not rare. June. (The stem not being at all channelled in the living plant, it is better to discard the earlier name of canaliculatum.) — Pedicels ½′ – 1½′ long: perianth ⅔′ long.

3. **P. latifòlium**, Desf. Upper part of the *stem* (2° – 3° high), the 1 – 5-flowered *peduncles*, *pedicels*, and lower surface of the ovate or oblong mostly *petioled leaves more or less pubescent*; *filaments glabrous*. (P. hirtum, *Pursh.* Convallaria hirta, *Poir.*) — Pennsylvania, *Muhlenberg!* — This appears to be essentially the European P. latifolium.

P. MULTIFLORUM, with hirsute filaments, I have never seen in this country.

3. SMILACÌNA, Desf. FALSE SOLOMON'S SEAL.

Perianth 4-6-parted, spreading, deciduous (white), with as many stamens inserted at the base of the divisions. Filaments slender: anthers short. Ovary 2-3-celled, with 2 ovules in each cell: style short and thick: stigma obscurely 2-3-lobed. Berry globular, 1-2-seeded. — Perennial herbs, with simple stems from creeping or thickish rootstocks, alternate nerved leaves, and white, often fragrant flowers in a terminal simple or compound raceme. (Name a diminutive of *Smilax*, which, however, these plants are quite unlike.)

§ 1. SMILACINA PROPER. — *Divisions of the perianth* (*oblong-lanceolate*) *and stamens* 6, *the latter longer: ovary* 3-*celled: ovules collateral: racemes crowded in a compound raceme or close panicle.*

1. **S. racemòsa,** Desf. (FALSE SPIKENARD.) Minutely downy; leaves numerous, oblong or oval-lanceolate, taper-pointed, ciliate, abruptly somewhat petioled. — Moist copses: common. June. — Stem 2° high from a thickish rootstock, zigzag. Berries pale red, speckled with purple, aromatic. (S. ciliata, *Desf.*, is a dwarf state of this.)

§ 2. ASTERÁNTHEMUM, Kunth. — *Divisions of the perianth* 6, *oblong-lanceolate, longer than the stamens: ovary* 2-3-*celled: ovules one above the other: raceme single,* 5-12-*flowered.*

2. **S. stellàta,** Desf. Nearly glabrous, or the 7-12 *oblong-lanceolate leaves* minutely downy beneath when young, slightly clasping; *berries blackish.* — Moist banks; common, especially northward. May, June. — Plant 1°-2° high. (Eu.)

3. **S. trifòlia,** Desf. Glabrous, *dwarf* (3′-6′ high); *leaves* 3 (sometimes 2 or 4), oblong, tapering to a *sheathing base; berries red.* — Cold bogs, New England to Wisconsin, and northward. May.

§ 3. MAIÁNTHEMUM, Desf. — *Divisions of the reflexed-spreading perianth* (*oval*) *and the stamens* 4, *of equal length: ovary* 2-*celled: ovules collateral: raceme single, many-flowered.*

4. **S. bifòlia,** Ker. Glabrous, or somewhat pubescent, low (3′-5′ high); leaves mostly 2 (sometimes 3), heart-shaped, petioled, or in our plant (var. CANADÉNSIS) one or both often sessile or nearly so and clasping. — Moist woods; very common, especially northward. May. (Eu.)

4. CONVALLÀRIA, L. (in part). LILY OF THE VALLEY.

Perianth bell-shaped (white), 6-lobed, deciduous; the lobes recurved. Stamens 6, included, inserted on the base of the perianth. Ovary 3-celled, tapering into a stout style: stigma triangular. Ovules 4-6 in each cell. Berry few-seeded (red). — A low perennial herb, glabrous, stemless, with slender running rootstocks, sending up from a scaly-sheathing bud 2 oblong leaves, with their long sheathing petioles enrolled one within the other so as to appear like a stalk, and an angled scape bearing a one-sided raceme of pretty sweet-scented nodding flowers. (Altered from *Lilium convallium*, the popular name.)

1. **C. majàlis,** L. — High Alleghanies of Virginia, and southward. May. — Same as the European plant so common in gardens. (Eu.)

5. CLINTÒNIA, Raf. CLINTONIA.

Perianth of 6 separate sepals, bell-shaped, lily-like, deciduous; the 6 stamens inserted at their base. Filaments long and thread-like: anthers linear-oblong. Ovary ovoid-oblong, 2-3-celled: style long, columnar-thread-like: stigma depressed. Berry ovoid, blue, few-many-seeded. — Stemless perennials, with slender creeping rootstocks, producing a naked scape sheathed at the base by the stalks of 2-4 large oblong or oval ciliate leaves. Flowers rather large, umbelled, rarely single, somewhat downy outside. (Dedicated to *De Witt Clinton.*)

1. **C. boreàlis,** Raf. *Umbel few- (2-7-) flowered;* ovules 20 or more. (Dracæna borealis, *Ait.*) — Cold moist woods, Massachusetts to Wisconsin and northward, and southward in the Alleghanies. June. — Scape and leaves 5′-8′ long. Perianth over ½′ long, greenish-yellow.

2. **C. umbellàta,** Torr. *Umbel many-flowered;* ovules 2 in each cell. (C. multiflora, *Beck.* Convallaria umbellulata, *Michx.* Smilacina, *Desf.*) — Rich woods, S. W. New York, and southward along the Alleghanies. June. — Flowers half the size of the last, white, speckled with green or purplish dots.

6. HEMEROCÁLLIS, L. DAY-LILY.

Perianth funnel-form, lily-like; the short tube enclosing the ovary, the spreading limb 6-parted; the 6 stamens inserted on its throat. Filaments and style long and thread-like, declined and ascending: stigma simple. Pod rather fleshy, 3-angled, 3-valved, with several black spherical seeds in each cell. — Showy perennials, with fleshy-fibrous roots; the long and linear keeled leaves 2-ranked at the base of the tall scapes, which bear at the summit several bracted large yellow flowers: these collapse and decay after expanding for a single day (whence the name, from ἡμέρα, *a day*, and κάλλος, *beauty*).

1. **H. FÚLVA,** L. (COMMON DAY-LILY.) Inner divisions (petals) of the tawny orange perianth wavy and obtuse. — Sparingly escaped from gardens, where it is common. July. (Adv. from Eu.)

H. FLÀVA, L., the YELLOW DAY-LILY, is commonly cultivated. — The White and the Blue Day-Lilies of the gardens are species of FUNKIA, a very different genus.

7. ORNITHÓGALUM, Tourn. STAR-OF-BETHLEHEM.

Perianth of 6 colored (white) spreading sepals, 3-7-nerved. Filaments 6, flattened-awl-shaped. Style 3-sided: stigma 3-angled. Pod membranous, roundish-angular, with few dark and roundish seeds in each cell. — Scape and linear channelled leaves from a coated bulb. Flowers corymbed, bracted. (An ancient whimsical name from ὄρνις, *a bird*, and γάλα, *milk*.)

1. **O. UMBELLÀTUM,** L. Flowers 5-8, on long and spreading pedicels; sepals green in the middle on the outside. — Escaped from gardens into moist meadows, eastward. June. (Nat. from Eu.)

8. SCÍLLA, L. SQUILL.

Perianth of 6 colored (blue or purple) spreading sepals, mostly deciduous; the 6 awl-shaped filaments at their base. Style thread-like. Pod 3-angled, 3-valved, with several black roundish seeds in each cell. — Scape and linear leaves from a coated bulb: the flowers in a simple raceme, mostly bracted. (The ancient name.)

1. **S. Fràseri.** (EASTERN QUAMASH. WILD HYACINTH.) Leaves long and linear, keeled; raceme elongated; bracts solitary, longer than the pedicels; stigma minutely 3-cleft; pod triangular, the cells several-seeded. (Phalangium esculentum, *Nutt.* in part. Scilla esculenta, *Ker.* Camassia Fraseri, *Torr. mss.*) — Moist prairies and river-banks, Ohio to Wisconsin and southwestward. May. — Bulb onion-like, eaten by the Indians. Scape 1° high. Sepals widely spreading, pale blue, 3-nerved, ½' long. (I do not discern sufficient characters for the genus Camassia.)

9. ÁLLIUM, L. ONION. GARLIC.

Perianth of 6 entirely colored sepals, which are distinct, or united at the very base, 1-nerved, often becoming dry and scarious and more or less persistent: the 6 filaments awl-shaped or dilated at their base. Style persistent, thread-like: stigma simple. Pod lobed, 3-valved, with 1 or few ovoid-kidney-shaped amphitropous or campylotropous black seeds in each cell. — Strong-scented and pungent stemless herbs; the leaves and scape from a coated bulb: flowers in a simple umbel, some of them frequently changed to bulblets; spathe 1 - 2-valved. (The ancient Latin name of the Garlic.)

* *Ovules and seeds only one in each cell: leaves broad and flat, appearing in early spring, and dying before the flowers are developed.*

1. **A. tricóccum,** Ait. (WILD LEEK.) Scape naked (9' high), bearing an erect many-flowered umbel; leaves lance-oblong (5' - 9' long, 1' - 2' wide); scapes 1° high from clustered pointed bulbs (2' long); sepals oblong (white), equalling the simple filaments; pod strongly 3-lobed. — Rich cool woods, W. New England to Wisconsin, Kentucky, and southward in the Alleghanies. July.

* * *Ovules and seeds mostly 2 in each cell: ovary crested with 6 teeth at the summit: leaves long and narrow.*

+ *Umbel bearing only flowers and ripening pods.*

2. **A. cérnuum,** Roth. (WILD ONION.) *Scape naked, angular* (1° - 2° high), often nodding at the apex, bearing a *loose or drooping many-flowered umbel; leaves linear, sharply keeled* (1° long); sepals oblong-ovate, acute (rose-color), shorter than the simple slender filaments. — Steep banks, W. New York to Wisconsin and southward. Aug.

3. **A. stellàtum,** Nutt. *Scape terete,* slender, bearing an *erect umbel; leaves flat;* sepals equalling the stamens: otherwise resembling the last, but usually not so tall; the pod more crested. — Rocky slopes, Illinois (*Engelmann*), and northwestward.

4. **A. Schœnoprăsum,** L. (CHIVES.) Scape naked, or leafy at the base ($\frac{1}{2}$° – 1° high) bearing a globular *capitate umbel* of many rose-purple flowers; sepals lanceolate, pointed, longer than the simple downwardly dilated filaments; *leaves awl-shaped, hollow.* Var. with recurved tips to the sepals (A. Sibiricum, *L.*) — Shore of Lakes Huron, Superior, and northward. (Eu.)

+ + *Umbel often densely bulb-bearing, with or without flowers.*

5. **A.** VINEÀLE, L. (FIELD GARLIC.) Scape slender, clothed with the sheathing bases of the leaves below the middle (1° – 3° high); *leaves terete, hollow.* slender, channelled above; *filaments much dilated, the alternate ones 3-cleft,* the middle division anther-bearing. — Moist meadows and fields, near the coast. June. — Flowers rose-color and green. (Nat. from Eu.)

6. **A. Canadénse,** Kalm. (WILD MEADOW GARLIC.) Scape leafy only at the base (1° high); *leaves narrowly linear, flattish;* umbel few-flowered; *filaments simple,* dilated below. — Moist meadows, &c. May, June. — Flowers pale rose-color, pedicelled; or a head of bulbs in their place.

* * * *Ovules several in each cell; leaves long and linear.* (Nothóscordum, *Kunth.*)

7. **A. striàtum,** Jacq. Leaves narrowly linear, often convolute, striate on the back, about the length of the obscurely 3-angled naked scape (6′ – 12′ long); filaments dilated below, shorter than the narrowly oblong sepals (which are white with a reddish keel); ovules 4 – 7 in each cell. — Prairies and open woods, Virginia to Illinois, and southward. May.

A. TRIFLÒRUM, Raf., from the mountains of Penn., is wholly obscure.

A. SATÌVUM, the GARDEN GARLIC, A. PÓRRUM, the LEEK, and A. CÈPA the ONION, are well-known cultivated species.

10. LÍLIUM, L. LILY.

Perianth funnel-form or bell-shaped, colored, of 6 distinct sepals, spreading or recurved above, with a honey-bearing furrow at the base, deciduous; the 6 stamens somewhat adhering to their bases. Anthers linear, versatile. Style elongated, somewhat club-shaped: stigma 3-lobed. Pod oblong, containing numerous flat (depressed) soft-coated seeds densely packed in 2 rows in each cell. — Bulbs scaly, producing simple stems, with numerous alternate-scattered or whorled short and sessile leaves, and from one to several large and showy flowers. (The classical Latin name, from the Greek λείριον.)

* *Flowers erect, bell-shaped, the sepals narrowed below into claws.*

1. **L. Philadélphicum,** L. (WILD ORANGE-RED LILY.) *Leaves linear-lanceolate; the upper chiefly in whorls* of 5 to 8; flowers 1 – 3, open-bell-shaped, *reddish-orange* spotted with purplish inside; the lanceolate sepals not recurved at the summit. — Open copses; rather common. June, July. — Stem 2° – 3° high: the flower $2\frac{1}{2}$′ long.

2. **L. Catesbæi,** Walt. (SOUTHERN RED LILY.) *Leaves linear-lanceolate, scattered;* flower solitary, open-bell-shaped, the long-clawed sepals wavy on the margin and recurved at the summit, *scarlet,* spotted with dark purple and yellow inside. — Low sandy soil, Pennsylvania? to Kentucky and southward.

* * *Flowers nodding, bell-shaped, the sessile sepals revolute.*

3. **L. Canadénse,** L. (WILD YELLOW LILY.) *Leaves remotely whorled,* lanceolate, strongly 3-nerved, the margins and nerves rough, flowers few, long-peduncled, oblong-bell-shaped, the *sepals recurved-spreading above the middle,* yellow, spotted inside with purple. — Moist meadows and bogs; common, especially northward. June, July. — Stem 2°-3° high. Flower 2′-3′ long.

4. **L. supérbum,** L. (TURK'S-CAP LILY.) *Lower leaves whorled,* lanceolate, pointed, 3-nerved, smooth; flowers often many (3-20 or 40) in a pyramidal raceme; *sepals strongly revolute,* bright orange, with numerous dark purple spots inside. — Rich low grounds; rather common. July, Aug. — Stem 3°-7° high: sepals 3′ long. L. Carolinianum, *Michx.*, is apparently a variety of this.

L. CÁNDIDUM, the WHITE LILY, and L. BULBÍFERUM, the ORANGE BULB-BEARING LILY, are most common in gardens.

11. ERYTHRÒNIUM, L. DOG'S-TOOTH VIOLET.

Perianth lily-like, of 6 distinct lanceolate sepals, recurved or spreading above, deciduous, the 3 inner usually with a callous tooth on each side of the erect base, and a groove in the middle. Filaments 6, awl-shaped: anthers oblong-linear. Style elongated. Pod obovate, contracted at the base, 3-valved. Seeds rather numerous, ovoid, with a loose membranaceous tip. — Nearly stemless herbs, with 2 smooth and shining flat leaves tapering into petioles and sheathing the base of the 1-flowered scape, rising from a deep solid-scaly bulb. Flower nodding, vernal. (Name from ἐρυθρός, *red,* which is inappropriate as respects the American species.)

1. **E. Americànum,** Smith. (YELLOW ADDER'S-TONGUE.) Leaves elliptical-lanceolate, pale green, spotted with purplish and dotted; *perianth pale yellow,* spotted near the base; style club-shaped; *stigmas united.* — Low copses, &c.; common. May. — Scape 6′-9′ high: flower 1′ or more long. — E. BRACTÀTUM, Boott, from the Camel's Rump Mountain, Vermont, is probably only an accidental state of this species.

2. **E. álbidum,** Nutt. (WHITE DOG'S-TOOTH VIOLET.) Leaves elliptical-lanceolate, spotted, not dotted; *perianth white or bluish-white;* sepals narrowly lanceolate, the inner without lateral teeth; style thread-like and club-shaped; *stigma 3-cleft.* — Low thickets from Albany, New York, and W. Pennsylvania to Wisconsin, and southward. April, May.

12. YÚCCA, L. BEAR-GRASS. SPANISH BAYONET.

Perianth of 6 petal-like (white) oval or oblong and acute flat sepals, withering-persistent, the 3 inner broader, longer than the 6 stamens. Stigmas 3, sessile. Pod oblong, somewhat 6-sided, 3-celled, or imperfectly 6-celled by a partition from the back, fleshy, tardily 3-valved at the apex. Seeds very many in each cell, depressed. — Stems woody, either very short, or rising into thick and columnar palm-like trunks, clothed with persistent rigid linear or sword-shaped leaves, and terminated by an ample compound panicle of showy (often polygamous) flowers. (An aboriginal name.)

1. **Y. filamentòsa**, L. (ADAM'S NEEDLE.) *Stemless*, i. e. the trunk (from a running rootstock) rising for a foot or less above the earth, covered with the *lanceolate unarmed coriaceous leaves* (1° – 2° long), which bear *filaments on their margins*; *scape* or flower-stem 6° – 8° high, erect. — Sandy soil, E. Virginia and southward. July.

Y. GLORIÒSA, L., and Y. ALOIFÒLIA, L. (SPANISH BAYONET), which are caulescent and thick-leaved species, belong farther south, and probably are not indigenous north of the coast of North Carolina.

The TULIP, the CROWN IMPERIAL, the HYACINTH, and the TUBEROSE (POLIÁNTHES TUBERÒSA) are common cultivated representatives of this Family.

ORDER 127. MELANTHÀCEÆ. (COLCHICUM FAMILY.)

Herbs, with regular 6-merous and 6-androus flowers, the consimilar perianth free (or nearly free) from the 3-celled ovary, extrorse anthers, and 3 more or less distinct styles. (Anthers introrse in Tofieldia, a connecting link with Juncaceæ. Styles sometimes perfectly united in Uvularieæ.) Seeds anatropous, with a soft or membranous seed-coat, and a small embryo in copious albumen. — If we include the Bellworts, which form a group ambiguous between this order, Trilliaceæ, and Liliaceæ, (all of which are connected by various gradations,) we shall have two strongly marked suborders, viz.: —

SUBORDER I. UVULARIEÆ. THE BELLWORT FAMILY.

Perianth early deciduous, the sepals distinct, petal-like. Styles united into one at the base or throughout! Fruit a 3-celled few-seeded berry or loculicidal pod. — Stems from small perennial rootstocks and fibrous roots, forking, bearing ovate or lanceolate membranaceous sessile or clasping leaves, like those of Solomon's Seal, and perfect flowers: peduncles solitary or 1-flowered.

1. UVULARIA. Pod 3-angular or 3-lobed. Anthers linear, adnate, on short filaments.
2. PROSARTES. Berry 3 - 6-seeded. Anthers linear-oblong, pointless, fixed near the base. Flowers terminal.
3. STREPTOPUS. Berry several-seeded. Anthers arrow-shaped, 1 - 2-pointed. Flowers axillary; their pedicels bent in the middle.

SUBORDER II. MELANTHIEÆ. TRUE COLCHICUM FAMILY.

Perianth mostly persistent or withering away; the sepals distinct, or rarely their claws united. Styles 3, separate. Fruit a 3-celled 3-partible or septicidal, rarely loculicidal, pod. — Herbs with acrid poisonous properties; the simple or rarely panicled stems springing from solid bulbs or corms, or sometimes from creeping rootstocks. Flowers sometimes polygamous or diœcious.

• Anthers heart-shaped or kidney-shaped, confluently 1-celled, shield-shaped after opening: pod 3-horned, septicidal: seeds flat, membranaceous-margined.

+ Sepals glandular on the inside near the base

4 MELANTHIUM. Flowers polygamous. Sepals entirely free from the ovary, their long claws bearing the stamens.

5. ZYGADENUS. Flowers perfect Sepals nearly free or coherent with the base of the ovary: stamens separate.

+ + Sepals destitute of glands, not clawed.

6. STENANTHIUM. Perianth below coherent with the base of the ovary; the sepals lanceolate. pointed, longer than the stamens. Racemes compound-panicled.

7. VERATRUM Perianth entirely free; the obovate or oblong sepals longer than the stamens Flowers panicled, polygamous.

8. AMIANTHIUM. Perianth free, the oval or obovate sepals shorter than the stamens Flowers racemed, perfect.

• • Anthers 2-celled: pod loculicidal. Flowers racemed or spiked.

9. XEROPHYLLUM. Flowers perfect. Cells of the globose-3-lobed pod 2-seeded. Leaves rush-like. Seeds 2 in each cell.

10. HELONIAS. Flowers perfect. Cells of the globose-3-lobed pod many-seeded. Leaves lanceolate. Scape naked. Seeds numerous.

11. CHAMÆLIRIUM. Flowers diœcious. Pod oblong, many-seeded. Stem leafy.

• • • Anthers 2-celled, innate or introrse: pod septicidal.

12. TOFIELDIA. Flowers perfect, spiked or racemed. Leaves equitant.

SUBORDER I. UVULARIÈÆ. THE BELLWORT FAMILY.

1. UVULÀRIA, L. BELLWORT.

Perianth nearly bell-shaped, lily-like; the sepals spatulate-lanceolate, with a honey-bearing groove or pit at the erect contracted base, much longer than the stamens, which barely adhere to their base. Anthers long and linear, adnate: filaments short. Style deeply 3-cleft; the divisions stigmatic along the inner side. Pod triangular or 3-lobed, 3-valved from the top. Seeds few in each cell, obovoid, with a tumid or fungous rhaphe. — Rootstock short or creeping. Flowers pale yellow, nodding, solitary or rarely in pairs, on terminal peduncles which become lateral by the growth of the branches. (Name "from the flowers hanging like the *uvula*, or palate.")

* *Leaves clasping-perfoliate: sepals acute: pod obovate-truncate, 3-lobed at the top.*

1. **U. grandiflòra,** Smith. (LARGE-FLOWERED BELLWORT.) Leaves oblong or elliptical-ovate, pale and obscurely pubescent underneath; *sepals smooth within; anthers blunt-pointed;* lobes of the pod with convex sides. — Rich woods, Vermont to Ohio, Wisconsin, and northward. May, June. — Flowers pale greenish-yellow, 1½′ long.

2. **U. perfoliàta,** L. (SMALLER BELLWORT.) Leaves ovate or oblong-lanceolate, smooth, glaucous underneath; *sepals granular-roughened inside; anthers conspicuously pointed;* lobes of the pod with concave sides. — Moist copses; common eastward and southward. May. — Smaller than No. 1: flowers pale yellow, ¾′ to 1′ long.

* * *Leaves sessile: sepals rather obtuse: pod ovoid-triangular, sharp-angled.*

3. **U. sessilifòlia,** L. (SESSILE-LEAVED BELLWORT.) *Smooth;* leaves oval or lanceolate-oblong, pale, *glaucous* underneath; styles united to the mid-

dle, exceeding the *pointless anthers; pod triangular-obovate, narrowed into a stalk.* — Low woods; common. May. — Stem 6′ – 9′ high when in flower: the cream-colored flower ¾′ long.

4. **U. pubérula,** Michx. Slightly *puberulent; leaves bright green both sides,* and shining, with rough edges; styles separate to near the base, not exceeding the *short-pointed anthers; pod ovate,* not stalked. — Mountains and throughout the upper part of Virginia, and southward.

2. PROSÁRTES, Don. Prosartes.

Perianth bell-shaped, much as in Uvularia. Filaments thread-like, much longer than the linear-oblong blunt anthers, which are fixed near the base. Ovary with 2 ovules suspended from the summit of each cell: styles united into one: stigmas short, recurved-spreading. Berry ovoid or oblong, pointed, 3 – 6-seeded, red. — Downy low herbs, divergently branched above, with closely sessile ovate and membranaceous leaves, and greenish-yellow drooping flowers on slender terminal peduncles, solitary or few in an umbel. (Name from *προσαρτάω, to hang from,* in allusion to the pendent ovules or flowers.)

1. **P. lanuginòsa,** Don. Leaves ovate-oblong, taper-pointed, rounded or slightly heart-shaped at the base, closely sessile, downy underneath; flowers solitary or in pairs; sepals linear-lanceolate, taper-pointed (½′ long), soon spreading, twice the length of the stamens, greenish; style smooth. (Streptopus lanuginosus, *Michx.*) — Rich woods, Western New York to Virginia, Kentucky, and southward along the Alleghanies. May.

3. STRÉPTOPUS, Michx. Twisted-Stalk.

Perianth recurved-spreading from a bell-shaped base; the sepals lanceolate-acute, the 3 inner keeled. Anthers arrow-shaped, fixed near the base to the short flattened filaments, tapering above to a slender entire or 2-cleft point. Ovary with many ovules in each cell: styles united into one. Berry red, roundish-ovoid, many-seeded. — Herbs, with rather stout stems, divergently-spreading branches, ovate and taper-pointed rounded-clasping membranaceous leaves, and small (extra-) axillary flowers, either solitary or in pairs, on slender thread-like peduncles, which are abruptly bent or contorted near the middle (whence the name, from *στρεπτός, twisted,* and *ποῦς, foot,* or *stalk*).

1. **S. amplexifòlius,** DC. *Leaves very smooth, glaucous underneath,* strongly clasping; *flower greenish-white* on a long peduncle abruptly bent above the middle; anthers tapering to a slender entire point; *stigma entire, truncate.* S.) distortus, *Michx.* Uvularia amplexifolia, *L.*) — Cold and moist woods, Northern New England to the mountains of Penn., and northward. June. — Stem 2° – 3° high, rough at the base, otherwise very smooth. Sepals ½′ long. — In this, as in the next, the peduncles are *opposite the leaves,* rather than truly axillary, and are bent round the clasping base underneath them: they are rarely 2-flowered. (Eu.)

2. **S. ròseus,** Michx. *Leaves green both sides, finely ciliate,* and the branches sparingly beset with short bristly hairs; *flower rose-purple,* more than half the

length of the slightly bent peduncle; anthers 2-horned; *stigma 3-cleft.* — Cold damp woods; common northward, and in the Alleghanies southward. May. — Smaller than the last.

SUBORDER II. MELANTHIEÆ. TRUE COLCHICUM FAMILY

4. MELÁNTHIUM, Gronov., L. MELANTHIUM.

Flowers monœciously polygamous. Perianth of 6 separate and free widely spreading somewhat heart-shaped or oblong and halberd-shaped sepals, raised on slender claws, cream-colored, the base marked with 2 approximate or confluent glands, turning greenish-brown and persistent. Filaments shorter than the sepals, adhering to their claws often to near their summit, persistent. Styles awl-shaped, diverging, tipped with simple stigmas. Pod ovoid-conical, 3-lobed, of 3 inflated membranaceous carpels united in the axis, separating when ripe, and splitting down the inner edge, several-seeded. Seeds flat, broadly winged. — Stem simple (3° – 5° high), from a somewhat bulbous base, roughish-downy above, as well as the open and ample pyramidal panicle (composed chiefly of simple racemes), the terminal part mostly fertile. Leaves lanceolate or linear, grass-like, those from the root broader. (Name composed of *μέλας*, *black*, and *ἄνθος*, *flower*, from the dark color which the persistent perianth assumes after blossoming.)

1. **M. Virgínicum,** L. (BUNCH-FLOWER.) (M. Virginicum & racemosum, *Michx.* Leimanthium Virginicum, *Willd.* L. Virg. & hybridum, *Roem. & Schult.*, *Gray*, *Melanth.*) — Wet meadows, Southern New York to Illinois, and common southward. July. — The two received species are doubtless forms of one.

5. ZYGADÈNUS, Michx. ZYGADENE.

Flowers perfect. Perianth withering-persistent, spreading; the petal-like sessile or slightly clawed oblong or ovate sepals 1 – 2-glandular next the more or less narrowed base, which is either free, or united and coherent with the base of the ovary. Stamens free from the sepals and about their length. Styles and pod nearly as in Melanthium. Seeds margined or slightly winged. — Very smooth and somewhat glaucous perennials, with simple stems from creeping rootstocks or coated bulbs, linear leaves, and pretty large panicled greenish-white flowers. (Name composed of *ζυγός*, *a yoke*, and *ἀδήν*, *a gland.*)

* *Glands on the perianth conspicuous.*

1. **Z. glabérrimus,** Michx. Stems 1° – 3° high, from a *creeping rootstock; leaves grass-like, channelled,* conspicuously nerved, elongated, tapering to a point; *panicle pyramidal,* many-flowered; perianth nearly free; the sepals (½′ long) ovate, becoming lance-ovate, with *a pair of orbicular glands above the short claw-like base.* — Grassy low grounds, S. Virginia (*Pursh*) and southward. July.

2. **Z. glaucus,** Nutt. Stem about 1° high from a *coated bulb; leaves flat; panicle simple,* mostly few-flowered; *base of the perianth coherent with the*

base of the ovary, the thin ovate or obovate sepals marked with a large obcordate *gland.* (Anticléa glauca, *Kunth.*) — Banks of the St. Lawrence, New York, to Wisconsin and northwestward: rare. July.

* * *Glands of the perianth obscure.* (Here also Amianthium Nuttallii, *Gray.*)

3. **Z. leimanthoides.** Stem 1° – 4° high from a somewhat bulbous base, slender; leaves narrowly linear; flowers small (4‴ in diameter) and numerous, in a few crowded panicled racemes; perianth free, the obovate sepals with a yellowish glandular discoloration on the contracted base. (Amianthium leimanthoides, *Gray.*) — Low grounds, pine-barrens of New Jersey (*Durand, Kniekern*), Virginia, and southward. July.

6. STENÁNTHIUM, Gray (under Veratrum).

Flowers polygamous or perfect. Perianth spreading; the sepals narrowly lanceolate, tapering to a point from the broader base, where they are united and coherent with the base of the ovary, not gland-bearing, persistent, much longer than the short stamens. Pods, &c. nearly as in Veratrum. Seeds nearly wingless. — Smooth, with a wand-like leafy stem from a somewhat bulbous base, long and grass-like conduplicate-keeled leaves, and numerous small flowers in compound racemes, forming a long terminal panicle. (Name composed of *στενός, narrow,* and *ἄνθος, flower,* from the slender sepals and panicles.)

1. **S. angustifòlium,** Gray. Leaves linear, elongated; flowers small (¼′ long), white, very short-pedicelled, in slender racemes; the prolonged terminal one, and often some of the lateral, fertile. (Veratrum angustifolium, *Pursh.* Helonias graminea, *Bot. Mag.*) — Grassy prairies and low meadows, Ohio, Illinois, Virginia, and southward toward the mountains. July. — Stem slender, 2° – 6° high.

7. VERÀTRUM, Tourn. FALSE HELLEBORE.

Flowers monœciously polygamous. Perianth of 6 spreading and separate obovate-oblong (greenish or brownish) sepals, more or less contracted at the base, entirely free from the ovary, not gland-bearing. Filaments free from the sepals and shorter than they, recurving. Pistils, fruit, &c. nearly as in Melanthium. — Somewhat pubescent perennials, with simple stems from a thickened base producing coarse fibrous roots (very poisonous), 3-ranked leaves, and racemed-panicled dull or dingy flowers. (Name compounded of *vere,* truly, and *ater,* black.)

1. **V. víride,** Ait. (AMERICAN WHITE HELLEBORE. INDIAN POKE.) *Stem stout, very leafy* to the top (2° – 4° high); *leaves* broadly oval, pointed, *sheath clasping, strongly plaited;* panicle pyramidal, the *dense spike-like racemes* spreading, perianth yellowish-green, moderately spreading. — Swamps and low grounds; common. June. (Too near V. album of Europe.)

2. **V. parviflòrum,** Michx. *Stem slender* (2° – 5° high), *sparingly leafy below, naked above; leaves scarcely plaited,* glabrous, contracted into *sheathing petioles,* varying from oval to lanceolate; panicle very long and loose, the terminal raceme wand-like, the lateral ones slender and spreading; *pedicels as long as the*

flowers; sepals dingy-green, oblanceolate or spatulate ($2\frac{1}{2}''$ - $3''$ long, those of the sterile flowers on claws, widely spreading. (Melanthium monoicum, *Walt.* Leimanthium monoicum, *Gray.*) — Rich woods, mountains of Virginia and southward. July.

3. **V. Woódii,** Robbins. Leaves lanceolate or oblong-lanceolate; *pedicels* ($1\frac{1}{2}''$ - $3''$ long) *shorter than the flowers,* the oblanceolate spreading *sepals* ($3''$ - $4\frac{1}{2}''$ long) dingy green turning *brownish purple within:* otherwise much as in the last, of which it may prove to be a variety; but the flowers are mostly double the size, the panicle stouter, &c. (Plant 3° - 6° high.) — Woods and hilly barrens, Green Co., Indiana, *Wood.* Augusta, Illinois, *Mead.* July.

8. AMIÁNTHIUM, Gray. FLY-POISON.

Flowers perfect. Perianth widely spreading; the distinct and free petal-like (white) sepals oval or obovate, sessile, not gland-bearing. Filaments capillary, equalling or exceeding the perianth. Anthers (as in all the foregoing) kidney-shaped or heart-shaped, becoming 1-celled, and shield-shaped after opening. Styles thread-like. Pods, &c. nearly as in Melanthium. Seeds wingless, oblong or linear, with a loose coat, 1 - 4 in each cell. — Glabrous plants, with simple stems from a bulbous base or coated bulb, scape-like, few-leaved, terminated by a simple dense raceme of handsome flowers, turning greenish with age. Leaves linear, keeled, grass-like. (From *ἀμίαντος, unspotted,* and *ἄνθος, flower;* a name made with more regard to euphony than to correctness of construction, alluding to the glandless perianth.)

1. **A. muscætóxicum,** Gray. (FLY-POISON.) *Leaves broadly linear,* elongated, obtuse ($\frac{1}{2}'$ to $1'$ wide), as long as the scape; *raceme simple,* oblong or cylindrical; pod abruptly 3-horned; seeds oblong, with a fleshy red coat. (Helonias erythrosperma, *Michx.*) — Open woods, New Jersey and Pennsylvania to Kentucky and southward. June, July.

9. XEROPHÝLLUM, Michx. XEROPHYLLUM.

Flowers perfect. Perianth widely spreading; sepals petal-like (white), oval, distinct, sessile, not glandular, at length withering, about the length of the awl-shaped filaments. Anthers 2-celled, short. Styles thread-like, stigmatic down the inner side. Pod globular-3-lobed, obtuse (small), loculicidal; the valves bearing the partitions. Seeds 2 in each cell, collateral, 3-angled, not margined. — Herb with the aspect of an Asphodel; the stem simple, 1° - 4° high, from a bulbous base, bearing a simple compact raceme of showy white flowers, thickly beset with needle-shaped leaves, the upper ones reduced to bristle-like bracts; those from the root very many in a dense tuft, reclined, 1° or more long, $1''$ wide below, rough on the margin, remarkably dry and rigid (whence the name, from *ξηρός, arid,* and *φύλλον, leaf*).

1. **X. asphodeloides,** Nutt. (X. tenax, *Nutt.* X. setifolium, *Michx.* Helonias, *L.*) — Pine barrens, New Jersey, Virginia? and southward. (Also in Oregon and California.) June.

10. HELÒNIAS, L. HELONIAS.

Flowers perfect. Perianth of 6 spatulate-oblong (purplish turning greenish) sepals, persistent, shorter than the thread-like filaments. Anthers 2-celled, roundish-oval, blue. Styles revolute, stigmatic down the inner side. Pod obcordately 3-lobed, loculicidally 3-valved; the valves divergently 2-lobed. Seeds many in each cell, linear, with a tapering appendage at both ends. — A smooth perennial, with many oblanceolate or oblong-spatulate flat leaves, from a tuberous rootstock, producing in early spring a hollow naked scape (1° - 2° high), sheathed with broad bracts at the base, and terminated by a simple and short dense raceme. Bracts obsolete: pedicels shorter than the flowers. (Name probably from ἕλος, *a swamp;* the place of growth.)

1. **H. bullàta,** L. (H. latifolia, *Michx.*) — Wet places, New Jersey, Pennsylvania, and Virginia: rare. May.

11. CHAMÆLÍRIUM, Willd. DEVIL'S-BIT.

Flowers diœcious. Perianth of 6 spatulate-linear (white) spreading sepals, withering-persistent. Filaments and (yellow) anthers as in Helonias: fertile flowers with rudimentary stamens. Styles linear-club-shaped, stigmatic along the inner side. Pod ovoid-oblong, not lobed, of a thin texture, loculicidally 3-valved from the apex, many-seeded. Seeds linear-oblong, conspicuously winged at each end. — A smooth herb, with a wand-like stem from a (bitter) thick and abrupt tuberous rootstock, terminated by a long and wand-like spiked raceme (4′ - 9′ long) of small bractless flowers; the fertile plant more leafy than the staminate. Leaves flat, lanceolate, the lowest spatulate, tapering into a petiole. (Name composed of χαμαί, *on the ground,* and λείριον, *lily;* of no obvious application.)

1. **C. lùteum.** (BLAZING-STAR.) (C. Carolinianum, *Willd.* Veratrum luteum, *L.* Helonias lutea, *Ait.* H. dioica, *Pursh.*) — Low grounds, W. New England to Illinois, and southward. June.

12. TOFIÉLDIA, Hudson. FALSE ASPHODEL.

Flowers perfect, usually with a little 3-bracted involucre underneath. Perianth more or less spreading; the sepals (white or greenish) concave, oblong or obovate, sessile. Filaments awl-shaped: anthers short, innate or somewhat introrse, 2-celled. Styles awl-shaped: stigmas terminal. Pod 3-angular, 3-partible or septicidal; the cells many-seeded. Seeds oblong. — Slender perennials, mostly tufted, with fibrous roots, and simple scape-like stems leafy only at the base, bearing small flowers in a close raceme or spike. Leaves 2-ranked, equitant, linear. (Named after *Mr. Tofield,* an English botanist of the last century.) — The two following compose the subgenus TRIÁNTHA, Nutt.: pedicels mostly in threes; the flowering proceeding from the apex downwards, seeds tail-pointed at both ends.

1. **T. glutinòsa,** Willd. Stem (6′ - 16′ high) and pedicels very *glutinous with dark glands;* leaves broadly linear, short. — Moist grounds, Maine, Michigan, Wisconsin, and northward: also southward in the Alleghanies. June.

2. **T. pùbens,** Ait. Stem (1° – 2° high) and pedicels *roughened with minute glands;* leaves longer and narrower. — Pine barrens, New Jersey to Virginia and southward. July.

T. PALÚSTRIS, Hudson, a Northern species of both hemispheres, grows on Isle Royale and the north shore of Lake Superior; but has not yet been found on the United States side.

ORDER 128. JUNCÀCEÆ. (RUSH FAMILY.)

Grass-like or sedge-like herbs, with jointed stems, and a regular persistent perianth of 6 *similar glumaceous sepals,* 6 *or rarely* 3 *stamens with introrse anthers, and a* 1 – 3*-celled ovary, forming a* 3*-valved* 3 *– many-seeded pod.* Style single. Seed anatropous, with a minute embryo enclosed at the base of the albumen. — Rushes, with the flowers liliaceous in structure, but grass-like in aspect and texture (excepting the ambiguous Narthecium).

Synopsis.

* Stigma entire. Perianth partly colored (yellowish).

1. NARTHECIUM. Filaments woolly. Pod many-seeded. Seeds long-tailed at both ends

* * Stigmas 3, thread-like, hairy. Sepals glume-like.

2. LUZULA. Pod 1-celled, 3-seeded. Leaves mostly hairy.
3. JUNCUS. Pod 3-celled (sometimes imperfectly so), many-seeded.

1. NARTHÈCIUM, Moehring. BOG-ASPHODEL.

Sepals linear-lanceolate (yellowish). Filaments 6, woolly: anthers linear. Pod cylindrical-oblong, pointed with the undivided style terminated by a single stigma, 3-celled, loculicidal, many-seeded. Seeds appendaged at each end with a bristle-form tail of great length. — Rootstock creeping, bearing linear equitant leaves, and a simple stem or scape (6′ – 10′ high), terminated by a simple raceme. (Name from ναρθήκιον, *a rod,* or *box for fragrant ointments;* application uncertain.)

1. **N. Americànum,** Ker. Pedicels of the dense raceme bearing a bractlet below the middle. — Bogs, pine barrens of New Jersey. June.

2. LÙZULA, DC. WOOD-RUSH.

Perianth glumaceous. Stamens 6. Stigmas 3. Pod 1-celled, 3-seeded. — Perennials, with flat and soft usually hairy leaves and spiked-crowded or umbelled flowers. (Name said to be altered from the Italian *lucciola,* a glowworm.)

* *Flowers loosely long-peduncled, umbelled or corymbed.*

1. **L. pilòsa,** Willd. Leaves lance-linear, hairy; *peduncles umbelled, simple,* chiefly 1-flowered; sepals pointed, shorter than the obtuse pod; seeds tipped with a curved appendage. — Woods and banks; common northward. May. — Plant 6′ – 9′ high. (Eu.)

2. **L. parviflòra,** Desv., var. **melanocárpa.** Nearly smooth; leaves broadly linear; *corymb decompound, loose; pedicels drooping;* sepals pointed,

straw-color, about the length of the minutely pointed brown pod. (L. melanocarpa, *Desv.*) — Mountains, Maine, W. Massachusetts, N. New York, and northward. July. — Stems 1° - 3° high, scattered. (Eu.)

* * *Flowers crowded in spikes or close clusters.* (*Plants 6′ - 12′ high.*)

3. **L. campéstris,** DC. *Leaves flat, linear; spikes* 4 - 12, *somewhat umbelled,* ovoid, straw-color, some of them long-peduncled, others nearly sessile; sepals bristle-pointed, longer than the obtuse pods; seeds with a conical appendage at the base. — Dry fields and woods; common. May. (Eu.)

4. **L. arcuàta,** Meyer. *Leaves channelled,* linear; *spikes* 3 - 5, *on unequal often recurved peduncles,* ovoid, chestnut-brown; bracts ciliate-fringed; sepals taper-pointed, longer than the obtuse pod; seeds not appendaged. — Alpine summits of the White Mountains, New Hampshire, and high northward. (Eu.)

5. **L. spicàta,** Desvaux. *Leaves channelled,* narrowly linear; *flowers in sessile clusters, forming a nodding interrupted spiked panicle,* brown; sepals bristle-pointed, scarcely as long as the abruptly short-pointed pod; seeds merely with a roundish projection at the base. (Our plant is L. racemosa, *Desv.*? according to *Godet.*) With the last, and more common. (Eu.)

3. JÚNCUS, L. RUSH. BOG-RUSH.

Perianth glumaceous. Stamens 6, or sometimes 3. Stigmas 3. Pod 3-celled (often imperfectly so at maturity), loculicidal, many-seeded. — Chiefly perennials, with pithy stems, and cymose, panicled, or clustered small (greenish or brownish) flowers, usually produced all summer. (The classical name, from *jungo*, to join, alluding to their use for bands.)

* *Scapes naked and simple from matted running rootstocks, many of them barren, furnished with short leafless sheaths at the base: flowers in a sessile cymose panicle produced from the side of the scape above the middle,* 6-*androus* (*except in No.* 1): *seeds not appendaged.*

1. **J. effùsus,** L. (COMMON or SOFT RUSH.) *Scape soft* and pliant (2° - 4° high), finely striated; *panicle diffusely much-branched* (sometimes closely crowded), many-flowered; sepals green, lanceolate, very acute, as long as the obovate very obtuse and pointless pod; stamens 3 or 6. — Marshy ground; everywhere. (Eu.)

2. **J. filifórmis,** L. *Scape slender* (1° - 2° high), pliant; *panicle few-flowered, simple;* sepals green, lanceolate, acute, rather longer than the very obtuse but short-pointed pod. (J. setaceus, *Torr. Fl.*) — Wet banks and shores, N. New England to Michigan, and northward. (Eu.)

3. **J. Bálticus,** Willd. *Scape rigid* (2° - 4° high), from a very strong rootstock; *panicle ascending, loose, dark chestnut-colored;* sepals ovate-lanceolate, the 3 outer sharp-pointed, as long as the elliptical rather triangular pod. — Sandy shores of New England and of the Great Lakes; thence northward (Eu.)

* * *Scapes, &c. as in the preceding, but some of the sheaths at the base leaf-bearing; the leaves terete, knotless, like the continuation of the scape above the panicle: stamens* 6.

4. **J. setàceus,** Rostk. *Scape slender* (2° – 3° high); *panicle loose, rather simple,* turning light chestnut-color; sepals lanceolate, sharp-pointed, especially the 3 exterior, longer than the obovate mucronate-pointed pod. — Penn., Virginia, and southward, near the coast.

5. **J. marítimus,** Lam. *Scape stout and rigid* (2° – 5° high), *the apex pungent; panicle compound,* erect, loose; the flowers clustered in small heads; sepals lanceolate, the outer acute, as long as the elliptical short-pointed pod. (J. acùtus, *Muhl.*, &c.) — Brackish marshes, New Jersey (*Pursh*), Virginia, and southward. (Eu.)

* * * *Stems leaf-bearing: leaves terete, or flattened laterally* (*equitant*), *knotted by cross partitions internally: cyme or panicle terminal: flowers in heads or small clusters* (*very liable to a monstrosity, from the bite of insects making them appear as if viviparous*) : *pod more or less* 1*-celled.*

+ *Stamens* 3.

6. **J. scirpoìdes,** Lam. Stem stout (1° – 3° high) and terete, as are the leaves; *panicle rather simple, bearing several* (5 – 18) *pale green densely many-flowered spherical heads; sepals* rigid, awl-shaped and *bristly-pointed,* especially the outer, as long as the oblong triangular taper-pointed pod; *seeds* barely pointed at each end, *tailless.* (J. polycephalus, *Michx.* (excl. var. *a* ?). J. echinatus, *Muhl.* J. nodosus, var. multiflorus, *Torr.*) — Wet borders of streams, &c.; rather common. — Rootstock thickish, creeping. Remarkable for its bur-like green heads, usually ½′ in diameter.

7. **J. paradóxus,** E. Meyer. Stem rather stout (1° – 2½° high), terete; leaves terete or somewhat flattened; *panicle decompound;* the numerous greenish *heads globular, many-* (8 – 15-) *flowered;* sepals lanceolate, somewhat awl-pointed, rigid, shorter than the oblong-triangular abruptly short-pointed pod; *seeds conspicuously tailed* at both ends! (J. polycephalus, *Darlingt.*, *Torr. Fl. N. Y.* excl. var. 3, & syn. J. fraternus, *Kunth.* J. sylvaticus, *Pursh.*) — Wet places; common. — Heads less dense, fewer-flowered, and sometimes smaller, than in the foregoing. Remarkable for the loose white seed-coat prolonged at both ends into a tail longer than the oblong body of the seed.

8. **J. débilis.** *Stems weak and slender* (1° – 2° long), *flattened,* as are the slender leaves; *panicle decompound, loose, widely spreading; the numerous pale green heads* 4 – 8*-flowered;* sepals lanceolate, acute, herbaceous, shorter than the oblong pod; *seeds tailless,* minutely and barely pointed at each end. (J. subverticillatus, *Muhl.*, not of *Wulf.* J. pallescens, *Meyer,* as to N. American plant. J. polycephalus, var.? depauperatus, *Torr. Fl. N. Y.*) — Wet swamps; common, especially southward and westward. — Roots fibrous. Stems often decumbent or floating and rooting: branches of the cymose panicle slender and diverging. Heads 2″ long. Pods pale, sometimes twice the length of the calyx when ripe. — This, which is pretty clearly the J. acuminatus of Kunth, is perhaps the plant of Michaux; but the next is the species taken for J. acuminatus by American authors.

9. **J. acuminàtus,** Michx. *Stem erect* (10′ – 15′ high), *terete,* leaves slender, nearly terete; *panicle with rather slightly spreading branches, bearing few or many* 3 – 8*-flowered chestnut-colored heads;* sepals lanceolate or linear-lanceolate,

very acute, one third or one half the length of the prismatic triangular and abruptly acute pod; *seeds tail-pointed* at both ends. (J. sylvaticus, *Muhl.* J. Canadensis, *Gay.*) — Peat-bogs, and sandy borders of ponds. — Pods turning deep chestnut-brown. Tails shorter than the body of the seed.

+- +- *Stamens* 6. (*Heads chestnut-colored: the pods becoming blackish or brown, and shining: seeds tailless, but sometimes short-pointed at both ends.*)

10. **J. articulàtus,** L. Stem erect (9′-18′ high), and with the 1-3 *slender leaves slightly compressed;* panicle spreading; *heads* 2-9-*flowered; sepals* lance-oblong, the outer acute, the inner mostly obtuse, usually mucronate, *shorter than the ovate-oblong triangular abruptly mucronate-pointed pod.* (J. lamprocarpus, *Ehrh.*, &c.) — Var. PELOCÀRPUS (J. pelocarpus, *E. Meyer & ed.* 1.) is a variety with fewer flowers in the head, and rather blunter pods slightly exceeding the sepals. — Wet places, Rhode Island to Lake Huron, and northward: the genuine European form received from *Mr. Olney* and *Dr. Sartwell.* (Eu.)

11. **J. militàris,** Bigel. Stem stout (2°-3° high), bearing a *solitary cylindrical bayonet-like leaf* below or near the middle, which overtops the crowded panicle; *heads numerous,* 5-10-*flowered; sepals lanceolate, sharp-pointed, as long as the ovate taper-pointed pod.* — Sandy bogs, Tewksbury and Plymouth, Massachusetts, pine barrens of New Jersey, and southward. Rootstock thick, creeping. Leaf stout, 1°-2° long. Heads 2″-3″ wide, brown.

12. **J. nodòsus,** L.! Stem erect, slender (6′-15′ high), 3-5-leaved; leaves terete, short; *heads* 1-2, *or several and clustered, globose, many-* (10-20-) *flowered; sepals lanceolate, awl-pointed, nearly as long as the slender triangular taper-pointed pod.* (J. Rostkovii, *E. Meyer.*) — Var. MEGACÉPHALUS, Torr.: heads rather numerous and larger, 50-60-flowered, crowded in a dense cluster at the summit of the stout and rigid stem (2° high). — Gravelly borders of streams; common, especially northward; the var. on the sandy shore of Lake Ontario, &c. — Rootstocks slender. — Quite distinct from No. 6 and No. 7, with which it has been confounded.

13. **J. Conrádi,** Tuckerm. Stems slender (6′-10′ high), leafy, branching above into a compound diffusely spreading *cymose panicle, bearing chiefly solitary scattered flowers* in the forks and along one side of the branches; *leaves thread-form,* the upper slightly knotted; *sepals oblong, acutish, shorter than the oblong taper-beaked pod.* (J. viviparus, *Conrad,* — so named from a condition in which most of the flowers develop into a tuft of rudimentary or manifest leaves. J. No. 15, *Muhl. Gram.?* and therefore J. Muhlenbergii, *Spreng.?*) — Wet sandy places, Canada and Wisconsin? N. New England to Virginia, and southward, chiefly near the coast. — Rootstocks slender.

* * * * *Leaves knotless: inflorescence terminal.*

+- *Heads cymose-panicled: leaves flat and open: stamens* 3.

14. **J. marginàtus,** Rostk. Stem leafy, erect, flattened (1°-3° high); leaves linear, grass-like, nerved; heads globose, 3-8-flowered; sepals oblong, the 3 outer with the bracts slightly awned, the inner obtuse and pointless, as long as the globular pod; seeds minutely pointed at both ends. (J. aristulatus, *Michx.*) — Moist sandy places, S. New England to Illinois, and southward. July. — Sepals soft, chestnut-purplish, with a green keel.

+- +- *Head single (or sometimes 2 or 3): leaves channelled above: stamens* 6.

15. **J. Stýgius,** L. *Stem* slender, erect (6′–10′ high), 1–*3-leaved below, naked above;* leaves thread-like; heads 3–4-flowered, about the length of the sheathing scarious awl-pointed bract; sepals oblong and lanceolate, scarcely more than half the length of the oblong acute pod; seeds oblong, with a very loose coat prolonged at both ends. — Peat-bog bordering Perch Lake, Jefferson County, New York. (Eu.)

16. **J. trífidus,** L. *Stems densely tufted* from matted creeping rootstocks, erect (5′–10′ high), wiry and thread-like, sheathed at the base, *leafless below, about 3-leaved at the summit;* the upper thread-like leaves subtending the sessile head of 2–4 flowers; sepals ovate or oblong, acute, rather than the globose-ovate beak-pointed (brown) pod; seeds roundish, angled. — Alpine summits of the mountains of N. New England and N. New York, and high northward. (Eu.)

+- +- +- *Flowers cymose-panicled, separate (not clustered in heads): leaves channelled or involute, or else thread-form, or almost setaceous: stamens* 6.

17. **J. ténuis,** Willd. Stems slender, wiry (9′–18′ high), simple, *leafy only near the base;* cyme shorter than the involucral leaves, small, the flowers mostly one-sided, almost sessile, green and shining; *sepals lanceolate, very acute, one third longer than the globose-ovoid obtuse pod.* — Low grounds and fields; very common.

18. **J. Greénii,** Oakes & Tuckerm. Stems rigid (1°–2° high), simple, naked, 1–*2-leaved at the base; cyme much shorter than the* principal erect *involucral leaf, dense,* the numerous crowded flowers one-sided; *sepals lanceolate, acute,* greenish, *shorter than the ovoid-oblong obtuse pod.* — Sandy coast of Long Island and New England, and occasionally on river-banks in the interior.

19. **J. bulbósus,** L. (Black Grass.) *Stems simple, somewhat flattened,* slender, but rigid (1°–2° high), *leafy below; panicle somewhat cymose,* rather crowded, usually shorter than the bracteal leaf; *sepals oval-oblong, obtuse,* incurved, chestnut-color and greenish, mostly rather shorter than the oblong-oval and somewhat triangular obtuse mucronate pod. (J. compressus, *Jacq.*: a name with which some supersede the Linnæan, because the stem is really not bulbous at the base.) — Var. Gerárdi (J. Gerardi, *Loisel.*, and J. Bothnicus, *Wahl.*) is the more common form in this country, with the panicle usually exceeding the bract, and the calyx as long as the pod. — Salt marshes; common along the coast from New Jersey northward. (Eu.)

20. **J. bufónius,** L. *Annual; stems low* and slender (3′–9′ high), *leafy,* often branched at the base; *panicle forking, spreading; the flowers remote,* greenish; *sepals lanceolate, awl-pointed,* much longer than the oblong obtuse pod. — Low grounds and road-sides, everywhere. (Eu.)

Order 129. PONTEDERIÀCEÆ. (Pickerel-weed Fam.)

Aquatic herbs, with perfect more or less irregular flowers from a spathe; the petal-like 6-merous perianth free from the 3-celled ovary; the 3 or 6 mostly unequal or dissimilar stamens inserted in its throat. — Perianth with the 6 divisions colored alike, *imbricated* in 2 rows in the bud, the whole together sometimes revolute-coiled after flowering, withering away, or the base thickened-persistent and enclosing the fruit. Anthers introrse. Ovules anatropous. Style 1: stigma 3-lobed or 6-toothed. Fruit a perfectly or incompletely 3-celled many-seeded pod, or a 1-celled 1-seeded utricle. Embryo slender, in floury albumen.

Synopsis.

1. PONTEDERIA. Perianth 2-lipped, its fleshy base enclosing the 1-seeded utricle. Stamens 6. Spike many-flowered.
2. HETERANTHERA. Perianth salver-shaped, withering-fugacious. Pod many-seeded. Stamens 3, unequal, of 2 forms. Spathe 1 – few-flowered.
3. SCHOLLERA. Perianth salver-shaped, regular. Stamens 3, alike. Spathe 1-flowered.

1. PONTEDÈRIA, L. Pickerel-weed.

Perianth funnel-form, 2-lipped; the 3 upper divisions united to form the 3-lobed upper lip; the 3 lower spreading, and their claws, which form the lower part of the curving tube, more or less separate or separable down to the base: after flowering the tube is revolute-coiled from the apex downwards, and its fleshy-thickened persistent base encloses the fruit. Stamens 6, the 3 lower exserted with elongated filaments; the 3 upper (often sterile or imperfect) with very short filaments, unequally inserted lower down: anthers oval, blue. Ovary 3-celled; two of the cells empty, the other with a single suspended ovule. Utricle 1-celled, filled with the single seed. — Stout herbs, growing in shallow water, with thick creeping rootstocks, producing erect long-petioled mostly heart-shaped leaves, and a 1-leaved scape, terminated by a spike of violet-blue ephemeral flowers. Root-leaves with a sheathing stipule within the petiole. (Dedicated to *Pontedera*, Professor at Padua at the beginning of the last century.)

1. **P. cordàta,** L. Leaves arrow-heart-shaped, blunt; spike dense, from a spathe-like bract. — Var. ANGUSTIFÒLIA (P. angustifolia, *Pursh*) has triangular-elongated and tapering leaves scarcely heart-shaped at the base. — Common. July – Sept. — Calyx-tube in fruit crested with 6 toothed ridges. Upper lobe of the perianth marked with a pair of small yellow spots.

2. HETERANTHÈRA, Ruiz & Pav. Mud Plantain.

Perianth salver-form with a slender tube; the spreading limb somewhat equally 6-parted, ephemeral, soon withering or decaying. Stamens 3; the 2 upper with their filaments thickened in the middle and bearing ovate (yellow) anthers; the other with a longer filament bearing a larger oblong or arrow-shaped (greenish) anther. Pod incompletely 3-celled, many-seeded. — Creeping or floating low herbs, with chiefly rounded long-petioled leaves, and a 1 – few-flowered spathe bursting from the sheathing side or base of a petiole. Flowers blue or white. (Name from ἑτέρα, *different*, and ἀνθηρά, *anther*.)

1. **H. renifórmis,** Ruiz & Pav. *Leaves round-kidney-shaped*; spathe 3 – 5-flowered; *flowers white*. — Muddy margins of streams, S. New York to Illinois, and southward. Aug.

2. **H. limòsa,** Vahl. *Leaves oblong* or lance-oblong, obtuse at both ends; spathe 1-flowered; *flowers blue.* (Leptanthus ovalis, *Michx.*) — W. Virginia to Illinois, and southward. July – Sept.

3. SCHÓLLERA, Schreber (1789). WATER STAR-GRASS.

Perianth salver-form, with 6 nearly equal lance-linear spreading divisions on a very long thread-like tube. Stamens 3, with similar oblong-arrow-shaped anthers (or rarely a fourth which is abortive): filaments nearly equal, awl-shaped. Pod oblong, invested by the withered perianth, 1-celled with 3 projecting parietal placentæ, many-seeded. — A grass-like herb, like a Pondweed, growing wholly under water, only the (small pale yellow) flowers expanding on the surface; the slender branching stems clothed with linear translucent sessile leaves, and bearing a terminal 1-flowered spathe. (Named after one *Scholler*, a German botanist.)

1. **S. gramínea,** Willd. (Leptanthus, *Michx.*) — In streams; common. July – Sept.

ORDER 130. COMMELYNÀCEÆ. (SPIDERWORT FAMILY.)

Herbs, with fibrous or sometimes thickened roots, jointed often branching leafy stems, and chiefly perfect and 6-androus, often irregular flowers, with the perianth free from the 2 – 3-celled ovary, and having a distinct calyx and corolla, viz.: Sepals 3, persistent, commonly herbaceous. Petals 3, ephemeral, decaying or deciduous. Stamens hypogynous, some of them often sterile: anthers with 2 separated cells. Style 1: stigma undivided. Pod 2 – 3-celled, 2 – 3-valved, loculicidal, 3 – several-seeded. Seeds orthotropous. Embryo small, pulley-shaped, partly sunk in a shallow depression at the apex of the albumen. Leaves ovate, lanceolate or linear, flat, sheathed at the base; the uppermost often dissimilar and forming a kind of spathe. — A chiefly tropical family, not aquatic, here represented only by two genera.

1. COMMELỲNA, Dill. DAY-FLOWER.

Flowers irregular. Sepals somewhat colored, unequal; the 2 lateral partly united by their contiguous margins. Two lateral petals rounded or kidney-shaped, on long claws, the odd one smaller. Stamens unequal, 3 of them fertile, one of which is bent inward: 3 of them sterile and smaller, with imperfect cross-shaped anthers: filaments naked. Pod 3-celled, two of the cells 2-seeded, the other 1-seeded or abortive. — Stems branching, often procumbent and rooting at the joints. Leaves contracted at the base into sheathing petioles; the floral one heart-shaped and clasping, folded together or hooded and forming a kind of spathe enclosing the flowers, which expand for a single morning and are recurved on their pedicel before and afterwards. Petals blue. Flowering all summer. (Dedicated to the early Dutch botanists *J.* and *G. Commelyn.*)

divisions colored alike, *imbricated* in 2 rows in the bud, the whole together sometimes revolute-coiled after flowering, withering away, or the base thickened-persistent and enclosing the fruit. Anthers introrse. Ovules anatropous. Style 1: stigma 3-lobed or 6-toothed. Fruit a perfectly or incompletely 3-celled many-seeded pod, or a 1-celled 1-seeded utricle. Embryo slender, in floury albumen.

Synopsis.

1. PONTEDERIA. Perianth 2-lipped, its fleshy base enclosing the 1-seeded utricle. Stamens 6. Spike many-flowered.
2. HETERANTHERA. Perianth salver-shaped, withering-fugacious. Pod many-seeded. Stamens 3, unequal, of 2 forms. Spathe 1-few-flowered.
3. SCHOLLERA. Perianth salver-shaped, regular. Stamens 3, alike. Spathe 1-flowered.

1. PONTEDÈRIA, L. Pickerel-weed.

Perianth funnel-form, 2-lipped; the 3 upper divisions united to form the 3-lobed upper lip; the 3 lower spreading, and their claws, which form the lower part of the curving tube, more or less separate or separable down to the base: after flowering the tube is revolute-coiled from the apex downwards, and its fleshy-thickened persistent base encloses the fruit. Stamens 6, the 3 lower exserted with elongated filaments; the 3 upper (often sterile or imperfect) with very short filaments, unequally inserted lower down: anthers oval, blue. Ovary 3-celled; two of the cells empty, the other with a single suspended ovule. Utricle 1-celled, filled with the single seed. — Stout herbs, growing in shallow water, with thick creeping rootstocks, producing erect long-petioled mostly heart-shaped leaves, and a 1-leaved scape, terminated by a spike of violet-blue ephemeral flowers. Root-leaves with a sheathing stipule within the petiole. (Dedicated to *Pontedera*, Professor at Padua at the beginning of the last century.)

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Perianth salver-form with a slender tube; the spreading limb somewhat equally 6-parted, ephemeral, soon withering or decaying. Stamens 3; the 2 upper with their filaments thickened in the middle and bearing ovate (yellow) anthers; the other with a longer filament bearing a larger oblong or arrow-shaped (greenish) anther. Pod incompletely 3-celled, many-seeded. — Creeping or floating low herbs, with chiefly rounded long-petioled leaves, and a 1 - few-flowered spathe bursting from the sheathing side or base of a petiole. Flowers blue or white. (Name from ἑτέρα, *different*, and ἀνθηρά, *anther*.)

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3. SCHÓLLERA, Schreber (1789). WATER STAR-GRASS.

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ORDER 130. COMMELYNÀCEÆ. (SPIDERWORT FAMILY.)

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1. COMMELỲNA, Dill. DAY-FLOWER.

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1. **C. erécta,** L. Stem erect, rather stout (2° - 4° high); leaves large (5′ - 7′ long, 1′ - 2′ wide), oblong-lanceolate, the upper surface and margins very rough backwards, *sheaths fringed with rusty bristles; spathes* crowded and *nearly sessile, hooded, top-shaped in fruit;* odd petal shaped like the others but shorter, round-ovate, raised on a claw; pod 3-celled. ♃ (C. Virginica, *ed.* 1, &c.) — A hairy form apparently is C. hirtella, *Vahl.* — Alluvial and shaded river-banks, Penn. to Illinois and southward. — Our largest species, and the only one with a top-shaped spathe.

2. **C. Virgínica,** L. Stems slender, erect, or reclined and rooting towards the base; leaves lanceolate or linear-lanceolate; *spathes* mostly solitary or scattered, *peduncled, conduplicate, round-heart-shaped* when expanded, pointed, in fruit somewhat hood-like, and with a short top-shaped base; odd petal usually inconspicuous and nearly sessile; pod 2-celled. ♃ (C. Virginica, *L.*, as to syn. *Pluk.*, which gave the name: Linnæus's detailed description apparently pertains to No. 1, which however must bear the name which he took from Dillenius, the authority for the species. C. angustifolia, *Michx. & ed.* 1.) — Damp rich woods and banks, S. New York to Michigan, Illinois, and southward.

3. **C. agrària,** Kunth. Stems creeping, glabrous; *leaves ovate-oblong or lance-oblong, obtuse, small* (1′ - 2′ long); *spathes* heart-ovate when expanded, *peduncled, conduplicate, the base not contracted in fruit,* 3 - 4-flowered; the odd petal round-ovate, nearly sessile. ♃ (C. Cajennensis, *Rich.*) — Alluvial banks, Illinois and southward. — The smallest-leaved and smallest-flowered species.

2. TRADESCÁNTIA, L. SPIDERWORT.

Flowers regular. Sepals herbaceous. Petals all alike, ovate, sessile. Stamens all fertile: filaments bearded. Pod 2 - 3-celled, the cells 1 - 2-seeded. — Perennials. Stems mucilaginous, mostly upright, nearly simple, leafy. Leaves keeled. Flowers ephemeral, in umbelled clusters, axillary and terminal; the floral leaves nearly like the others. (Named for the elder *Tradescant*, gardener to Charles the First.)

* *Umbels sessile, clustered, usually involucrate by 2 leaves.*

1. **T. Virgínica,** L. (COMMON SPIDERWORT.) *Leaves lanceolate-linear, elongated,* tapering from the sheathing base to the point, ciliate, more or less open; *umbels terminal,* many-flowered. — Moist woods, from W. New York to Wisconsin, and southward: commonly cultivated. May - Aug. — Plant either smooth or hairy; the large flowers blue, in gardens often purplish or white.

2. **T. pilòsa,** Lehm. *Leaves broadly lanceolate* from a narrowed base, pointed, downy-hairy both sides, minutely ciliate; *umbels* many-flowered, in very dense *terminal and axillary* clusters; pedicels and calyx glandular-hairy. (T. flexuosa, *Raf.*) — Ohio, Illinois, Kentucky, and southward. June - Sept. — Stem stout, smooth below, 2° - 3° high, often branched, zigzag above, with an at length close cluster of small (¾′ broad) lilac-blue flowers in all the upper axils.

* * *Umbels long-peduncled, naked.*

3. **T. ròsea,** Vent. Small, slender (6′ - 10′ high), smooth; leaves linear, grass-like, ciliate at the base; umbel simple, or sometimes a pair; flowers (½′ wide) rose-color. — Sandy woods, Penn. (?) to Kentucky, and southward.

ORDER 131. XYRIDÀCEÆ. (YELLOW-EYED GRASS FAM.)

Rush-like herbs, with equitant leaves sheathing the base of a naked scape, which is terminated by a head of perfect 3-androus flowers, with extrorse anthers, a glumaceous calyx, and a regular corolla; the 3-valved mostly 1-celled pod containing several or many orthotropous seeds with a minute embryo at the apex of fleshy albumen: — represented by Xyris. — The anomalous genus Mayaca, consisting of a few moss-like aquatic plants, intermediate in character between this family and the last, may be introduced here.

1. MAYÀCA, Aublet. (SYÈNA, *Schreber.*)

Flowers single, terminating a naked peduncle. Perianth persistent, of 3 herbaceous lanceolate sepals and 3 obovate petals. Stamens 3, alternate with the petals. Ovary 1-celled with 3 parietal few-ovuled placentæ: style filiform: stigma simple. Pod 3-valved, several-seeded — Moss-like low herbs, creeping in shallow water, densely leafy; the leaves narrowly linear, sessile, 1-nerved, pellucid, entire, notched at the apex: the peduncle solitary, sheathed at the base. (An aboriginal name.)

1. **M. Michaùxii,** Schott & Endl. Peduncles not much exceeding the leaves, nodding in fruit; petals white. (Syena fluviatilis, *Pursh.*) — S. E. Virginia, and southward. July.

2. XỲRIS, L. YELLOW-EYED GRASS.

Flowers single in the axils of coriaceous scale-like bracts, which are densely imbricated in a head. Sepals 3; the 2 lateral glume-like, boat-shaped or keeled and persistent; the anterior one larger and membranaceous, enwrapping the corolla in the bud and deciduous with it. Petals 3, with claws, which cohere more or less. Fertile stamens 3, with linear anthers, inserted on the claws of the petals, alternating with 3 sterile filaments which are cleft and plume-bearing at their apex. Style 3-cleft. Pod oblong, free, 1-celled with 3 parietal more or less projecting placentæ, 3-valved, many-seeded. — Flowers yellow. (Ξυρίς, an ancient name of some plant with 2-edged leaves, from ξυρόν, *a razor.*)

1. **X. bulbòsa,** Kunth. Scape slender, from a more or less bulbous base, somewhat 3-angled, flattish at the summit, very smooth, much longer than the narrowly linear leaves, both commonly twisted with age; head roundish-ovoid (4″ – 5″ long); *lateral sepals* oblong-lanceolate, *finely ciliate-scabrous on the narrow wingless keel,* and usually with a minute bearded tuft at the very apex. (X. Jupacai, *Michx.* in part. X. Indica, *Pursh.* X. flexuosa, *Muhl. Cat.* X. brevifolia, of Northern authors, not of *Michx.*) — Sandy or peaty bogs, from New Hampshire and Michigan southward: rare except near the coast. July – Sept. — Leaves 1½′ – 8′, the scape 3′ – 14′, high. Petals minutely toothed at the summit. — This species should have borne Muhlenberg's name of X. flexuosa, which, however, Elliott appears to have applied rather to the following.

2. **X. Caroliniàna,** Walt. Scape flattish, 1-angled below, 2-edged at the summit, smooth; leaves linear-sword-shaped, flat; head globular-ovoid (5″

– 7 long); *lateral sepals obscurely lacerate-fringed above on the winged keel,* rather shorter than the bract. (X. Jupacai, partly, *Michx.* X. anceps, *Muhl.*) — Sandy swamps, &c., Rhode Island to Virginia and southward, near the coast. Aug. — Scape 1° - 2° high: leaves 1″ - 4″ wide. Petals pretty large, the claws turning brownish.

3. **X. fimbriàta,** Ell. Scape somewhat angled (2° high), rather longer than the linear-sword-shaped leaves; head oblong (¾′ long); *lateral sepals* lanceolate-linear, *nearly twice the length of the bruct, above conspicuously fringed on the wing-margined keel, and even plumose at the summit.* — Pine barrens of New Jersey, Virginia, and southward.

ORDER 132. ERIOCAULONÀCEÆ. (PIPEWORT FAMILY.)

Aquatic or marsh herbs, stemless or short-stemmed, with a tuft of fibrous roots, and a cluster of linear often loosely cellular grass-like leaves, and naked scapes sheathed at the base, bearing dense heads of monœcious or rarely diœcious small 2 – 3-merous flowers, each in the axil of a scarious bract; the perianth double or rarely simple, chaffy; anthers introrse; the fruit a *2 – 3-celled 2 – 3-seeded pod:* the ovules, seeds, embryo, &c. as in the preceding order. — Chiefly tropical plants, a few in northern temperate regions.

Synopsis.

1. ERIOCAULON. Perianth double, the inner (corolla) tubular-funnel-form in the staminate flowers; the stamens twice as many as its lobes (4 or 6). Anthers 2-celled.
2. PÆPALANTHUS. Perianth as in the last: the stamens only as many as the lobes of the inner series, or corolla (3). Anthers 2-celled.
3. LACHNOCAULON. Perianth simple, of 3 sepals. Stamens 3, monadelphous below. Anthers 1-celled.

1. ERIOCAÙLON, L. PIPEWORT.

Flowers monœcious and androgynous, i. e. both kinds in the same head, either intermixed, or the central ones sterile and the exterior fertile, rarely diœcious. *Ster. Fl.* Calyx of 2 or 3 keeled or boat-shaped sepals, usually spatulate or dilated upwards. Corolla tubular, 2 – 3-lobed, each of the lobes bearing a black gland or spot. Stamens twice as many as the lobes of the corolla, one inserted at the base of each lobe and one in each sinus; anthers 2-celled. Pistils rudimentary. *Fert. Fl.* Calyx as in the sterile flowers, often remote from the rest of the flower (therefore perhaps to be viewed as a pair of bractlets). Corolla of 2 or 3 separate narrow petals. Stamens none. Ovary often stalked, 2 – 3-lobed, 2 – 3-celled, with a single ovule in each cell: style 1: stigmas 2 or 3, slender. Pod membranaceous, loculicidal. — Leaves mostly smooth, loosely cellular and pellucid. Scapes or peduncles terminated by a single head, which is involucrate by some outer empty bracts. Flowers, also the tips of the bracts, &c., usually bearded or woolly. (Name compounded of *ἔριον, wool*, and *καυλός, a stalk*, from the wool at the base of the scape and leaves of the original species. Excepting this and the flowers, our species are wholly glabrous.) — The North

American species are all stemless, with a depressed head, and have the parts of the flowers in twos, the stamens 4.

1. **E. decangulàre,** L. (*syn. Pluk.*, &c.) *Leaves linear-sword-shaped*, ascending (6′ - 15′ long), of a rather firm texture; *scape* 10 - 12-*ribbed* (1° - 3° high): *chaff* (bracts among the flowers) *pointed.* ♃ (E. serótinum, *Walt.*) — Pine-barren swamps, New Jersey? to Virginia, and southward. July - Sept. — Involucral scales roundish, straw-color or light brown. Flowers and bracts, as in the following, tipped with a white beard.

2. **E. gnaphalòdes,** Michx. *Leaves short and spreading* (2′ - 5′ long), *grassy-awl-shaped*, soft and cellular, tapering gradually to a point, mostly shorter than the sheath of the 10-*ribbed scape; chaff obtuse.* ♃ (E. decangulare, *L.*, in part, viz. as to *pl. Clayt.*) — Pine-barren swamps, New Jersey to Virginia, and southward. June - Aug. — This and the last have been variously confounded.

3. **E. septangulàre,** Withering. *Leaves short* (1′ - 3′ long), *awl-shaped, pellucid*, soft and very cellular; *scape* 7-*striate*, slender, 2′ - 6′ high, or when submerged becoming 1° - 6° long (*Torr.*), according to the depth of the water; *chaff acutish.* ♃ (E. pellucidum, *Michx.*) — In ponds or along their borders, from New Jersey and Penn. to Michigan, and northward. Aug. — Head 2″ - 3″ broad; the bracts, chaff, &c. lead-color, except the white coarse beard. (Eu.)

2. PÆPALÁNTHUS, Mart. (Sp. of ERIOCAULON of authors.)

Stamens as many as the (often involute) lobes of the funnel-form corolla of the sterile flowers, and opposite them, commonly 3, and the flower ternary throughout. Otherwise nearly as in Eriocaulon. (Name from παιπάλη, *dust* or *flour*, and ἄνθος, *flower*, from the meal-like down or scurf of the heads and flowers of many [South American] species.)

1. **P. flávidus,** Kunth. Tufted, stemless; leaves bristle-awl-shaped (1′ long); scapes very slender, simple, minutely pubescent (6′ - 12′ high), 5-angled; bracts of the involucre oblong, pale straw-color, those among the (ternary) flowers mostly obsolete; perianth glabrous; sepals and petals of the fertile flowers linear-lanceolate, scarious-white. ♃ ? (Eriocaulon flavidum, *Michx.*) — Low pine barrens, S. Virginia and southward.

3. LACHNOCAÙLON, Kunth. HAIRY PIPEWORT.

Flowers monœcious, &c., as in Eriocaulon. Calyx of 3 sepals. Corolla none! *Ster. Fl.* Stamens 3: filaments below coalescent into a club-shaped tube around the rudiments of a pistil, above separate and elongated: anthers 1-celled! *Fert. Fl.* Ovary 3-celled, surrounded by 3 tufts of hairs (in place of a corolla). Stigmas 3, two-cleft. — Leaves linear-sword-shaped, tufted. Scape slender, simple, bearing a single head, 2 - 3-angled, hairy (whence the name, from λάχνος, *wool*, and καυλός, *stalk*).

1. **L. Michaùxii,** Kunth. (Eriocaulon villosum, *Michx.*) — Low pine barrens, Virginia (*Pursh*), and southward.

ORDER 133. CYPERÀCEÆ. (SEDGE FAMILY.)

Grass-like or rush-like herbs, with fibrous roots and solid stems (culms), *closed sheaths, and spiked chiefly 3-androus flowers, one in the axil of each of the glume-like imbricated bracts* (scales, glumes), *destitute of any perianth, or with hypogynous bristles or scales in its place; the 1-celled ovary with a single erect anatropous ovule, in fruit forming an achenium.* Style 2-cleft when the fruit is flattened or lenticular, or 3-cleft when it is 3-angular Embryo minute at the base of the somewhat floury albumen. Stem-leaves when present 3-ranked. — A large, widely diffused family.

Synopsis.

TRIBE I. **CYPEREÆ.** Flowers perfect, 2-ranked (distichous), 1 - many-flowered.

1. CYPERUS. Spikes few - many-flowered, usually elongated or slender. Perianth none.
2. KYLLINGIA. Spikes 1-flowered, glomerate in a sessile head. Perianth none.
3. DULICHIUM. Spikes 6 - 10-flowered. Perianth of 6 - 10 bristles. Achenium beaked.

TRIBE II. **HYPOLYTREÆ.** Flowers perfect; the scales many-ranked: each flower provided with its own (1 - 4) proper scale-like bractlets. True perianth none.

4. HEMICARPHA. Bractlet or inner scale 1, very small. Stamen 1. Style 2-cleft.

TRIBE III. **SCIRPEÆ.** Flowers perfect; the scales regularly several-ranked, each covering a naked flower, or only the lowest empty. Perianth of bristles or hairs, or none.

* Perianth of hypogynous bristles or hairs (rarely obsolete or wanting).

5. ELEOCHARIS. Achenium with a tubercle jointed on its apex, consisting of the bulbous persistent base of the style. Head solitary, terminating the leafless and bractless culm.
6. SCIRPUS. Achenium naked at the apex, or pointed with the continuous simple base of the style. Perianth of 3 - 6 bristles. Culms leafy at the base Heads one or more.
7. ERIOPHORUM. Achenium, &c., as in Scirpus. Perianth of long and tufted woolly hairs.

* * Perianth none.

8. FIMBRISTYLIS. Style bulbous at the base, deciduous (with or rarely without the jointed bulb) from the achenium.

* * * Perianth of 3 large scales, and mostly as many alternating bristles

9. FUIRENA. Scales of the spike awned below the apex. Achenium triangular, pointed with the base of the style.

TRIBE IV. **RHYNCHOSPOREÆ.** Flowers perfect or polygamous Scales of the few-flowered spikes irregularly several-ranked, many of the lower ones empty, and often the upper sterile. Perianth of bristles or none. Stems leafy.

* Achenium beaked with the dilated persistent style or its base.

+ Perianth none: style 2-cleft: achenium wrinkled transversely.

10. PSILOCARYA. Spikes many-flowered, terete, ovoid, cymose, naked
11. DICHROMENA. Spikes few-flowered, flattened, crowded into a leafy-involucrate head

+ + Perianth of bristles or awns, rarely wanting

12. CERATOSCHŒNUS. Style simple, all persistent in the awned beak of the flat achenium
13. RHYNCHOSPORA. Style 2-cleft, the base only persistent as a tubercle on the achenium

* * Achenium without a beak or tubercle; the style deciduous.

14. CLADIUM. Achenium globular, corky or pointed at the summit. Perianth none.

TRIBE V. **SCLERIEÆ.** Flowers monœcious: the fertile spikes 1-flowered; the staminate several-flowered. Achenium nut-like, mostly crustaceous.

15. SCLERIA. Achenium bony or crustaceous. Proper perianth none.

TRIBE VI. **CARICEÆ.** Flowers monœcious in the same (androgynous) or in separate spikes, or sometimes diœcious. Proper perianth none. Achenium enclosed in a sac (*perigynium* which answers to a bractlet or pair of bractlets), lenticular or triangular.

16 **CAREX.** Fertile flowers without a bristle-form hooked appendage projecting from the sac

1 CYPÈRUS, L. GALINGALE.

Spikes many-few-flowered, flat or rarely terete, variously arranged, mostly in clusters or heads, which are commonly disposed in a simple or compound terminal umbel. Scales 2-ranked (their decurrent base often forming margins or wings to the joint of the axis next below), deciduous when old. Stamens (1, 2, or mostly) 3. Perianth none. Style 2-3-cleft, deciduous. Achenium lenticular or triangular, naked at the apex. — Culms triangular, simple, leafy at the base, and with one or more leaves at the summit forming an involucre to the umbel. Peduncles unequal, sheathed at the base. (Κύπειρος, the ancient name.)

§ 1. PYCRÈUS, Beauv. — *Style 2-cleft: achenium flattened: spikes flat, many-flowered: only the lowest scale empty.* (*Root of all our species fibrous and apparently annual.*)

1. **C. flavéscens,** L. *Stamens* 3; spikes becoming linear, obtuse, clustered at the end of the 2-4 very short rays (peduncles); *scales obtuse, straw-yellow; achenium shining, orbicular.* — Low grounds, mostly near the coast. Aug. — Culms 4′-10′ high: spikes 5″-8″ long. Involucre 3-leaved, very unequal. (Eu.)

2. **C. diándrus,** Torr. *Stamens 2, or sometimes* 3; spikes lance-oblong, scattered or clustered on the 2-5 very short or unequal rays; *scales rather obtuse, purple-brown* on the margins or nearly all over; *achenium dull, oblong-obovate:* otherwise much like the last. — Var. CASTÀNEUS, Torr. (C. castaneus, *Bigel.*) is only a form with browner scales. — Low grounds; common. Aug., Sept.

3. **C. Nuttállii,** Torr. *Stamens* 2; spikes lance-linear, acute, very flat (½′-1′ long), crowded on the few very short (or some of them distinct) rays; *scales oblong, yellowish-brown,* rather loose; *achenium oblong-obovate, very blunt, dull.* — Salt or brackish marshes, Massachusetts to Virginia, and southward. Aug. — Culms 4′-12′ high. — C. minimus? *Nutt.*, the C. Cleaveri, *Torr.*, *& ed.* 1, is a depauperate condition of this, with a 1-leaved involucre, and only one or two spikes!

4. **C. flavícomus,** Michx. *Stamens* 3; spikes linear (4″-8″ long), spiked and crowded on the whole length of the branches of the several-rayed umbel, spreading; *scales oval, very obtuse, yellowish and brownish, broadly scarious-* (*whitish-*) *margined; achenium obovate, mucronate,* blackish; culm stout (1°-3° high); leaves of the involucre 3-5, very long. — Low grounds, Virginia and southward. July-Oct.

§ 2. PAPỲRUS, Thouars. — *Style 3-cleft: achenium triangular: stamens* 3: *spikes many-flowered, flattish: joints of the axis margined by a pair of more or less free scales, which remain after the proper scale falls away: otherwise as in* § 3.

5. **C. erythrorhizos,** Muhl. Culm obtusely triangular (2° – 3° high); umbel compound, many-rayed; involucre 4 – 5-leaved, very long; involucels bristle-form; spikes very numerous, crowded in oblong-cylindrical nearly sessile heads, spreading horizontally, linear, flattish (½′ long), bright chestnut-colored; scales lanceolate, mucronulate. ① — Alluvial banks, Penn. to Wisconsin? and southward. August. — Root fibrous, red.

§ 3. CYPERUS PROPER. — *Style 3-cleft: achenium triangular: spikes many-flowered, flat or almost terete; only the lowest scale empty; the joints of the axis narrowly wing-margined or naked.*

* *Roots annual, fibrous: no creeping rootstocks: culm triangular: spikes awl-shaped, thread-shaped, or very narrowly linear, very numerous, crowded at the summit of the rays of the simple or mostly compound ample and open umbel: involucre very long, 3 – several-leaved: scales of the spike pointless; the joints of the axis winged by a pair of adherent scales: stamens 3.*

6. **C. Michauxiànus,** Schultes. Culm stout (1° high); *rays short; spikes linear-thread-shaped, teretish when mature* (¼′ – ½′ long); the *joints of its axis short and winged with very broad scaly margins,* which embrace the *ovate triangular achenium;* scales ovate, obtusish. — Marshes, especially along the coast and large rivers, S. New England to Wisconsin, and southward. Aug., Sept. — Flowers 6 – 20 in the spike, yellowish-brown.

7. **C. Engelmánni,** Steud. Culm ½° – 3° high; rays mostly short; *spikes filiform, almost terete* (about ½′ long), *somewhat remotely* 5 – 9-*flowered,* the *zigzag joints of the axis slender, narrowly wing-margined; achenium oblong-linear,* almost equalling the oblong or oval broadly scarious scale. (C. tenuior, *Engelm.* mss. C. stenólepis, *Torr.*, probably, though the character does not accord: the greenish keel or centre was perhaps taken for the whole scale, which is not narrow, so the name is inapplicable as well as doubtful.) — Low banks of streams, Wisconsin, Illinois, Virginia? and southward. — Between the foregoing and the next. The scales of the spike are so separated that their base is never touched by the one next beneath on the same side.

8. **C. strigòsus,** L. Culm mostly stout, *bulbous-thickened* at the base (1° – 3° high); some of the *rays elongated,* their sheaths 2-bristled; *spikes linear-awl-shaped, but flat,* 8 – 15-flowered, very numerous, reflexed with age; the *slender joints of the axis narrowly wing-margined;* scales oblong-lanceolate, several-nerved, much longer than the *linear-oblong achenium.* — Var. SPECIÒSUS (C. speciosus, *Vahl? Torr.*) is a rank state, with some of the partial umbels furnished with a leafy involucel. — Low or rich grounds; common, especially southward. July – Sept. — Spikes greenish, turning straw-color, ½′ – 1′ long.

* * *Roots annual, fibrous: stamen only* 1: *culm slender, low* (1′ – 12′ *high*): *spikes flat, oblong-linear or ovate, crowded into heads on the few simple or compound rays: involucre 2 – 3-leaved; scales of the spike with spreading points: joints of the axis slightly or not at all margined.*

9. **C. inflèxus,** Muhl. Dwarf (1′ – 5′ high); *spikes oblong-linear,* 7 – 13-flowered, collected in 2 – 3 ovate heads (either sessile and clustered or short-peduncled); *scales nerved, tapering into a long recurved point;* achenium obovate, obtuse. — Sandy wet shores; common. July – Sept. — Sweet-scented in drying.

10. **C. acuminàtus,** Torr. Slender (3′ – 12′ high); *spikes ovate, becoming oblong,* 16 – 30-flowered, pale, collected in simple or compound heads; *scales obscurely 3-nerved, their short acute tips somewhat spreading;* achenium oblong, pointed at both ends. — Low ground, Illinois and westward.

* * * *Root perennial: stamen only* 1: *spikes short and flat, ovate and oblong, crowded in close globular heads; the joints of the axis not margined.*

11. **C. virens,** Michx. Culm (1° – 4° high) either sharply or obtusely triangular; leaves and involucre very long, keeled; umbel compound, many-rayed; achenium oblong or linear, ½ to ⅔ the length of the narrow oblong acutish scale. (C. vegetus, *Torr.*) — Wet places, Virginia and southward. — Heads of spikes green, turning tawny.

* * * * *Root perennial: rootstocks creeping, or tuberous: stamens* 3.

+ *Spikes flat, closely flowered, ovate-oblong or becoming broadly linear,* 3 – 5 *at the end of each ray of the compound umbel.*

12. **C. dentàtus,** Torr. Culm slender (6′ – 12′ high); umbel 4 – 7-rayed; spikes 6 – 30-flowered; scales strongly keeled, and with abruptly sharp-pointed slightly spreading tips, reddish-brown on the sides, green on the back; achenium obovate, sharply triangular. — Sandy swamps, Massachusetts to Virginia, and southward. Aug. — Spikes 2″ – 5″ long, sometimes changing into leafy tufts

+ + *Spikes flat, closely flowered, linear* (½′ – 1′ *long*), *loosely spiked along the upper part of the rays of the open umbel: rootstocks slender, creeping extensively, and bearing small nut-like tubers.*

13. **C. rotúndus,** L., var. **Hýdra.** (NUT-GRASS.) Culm slender (½° – 1½° high), longer than the leaves; umbel simple or slightly compound, about equalling the involucre; the few rays each bearing 4 – 9 *dark chestnut-purple* 12 – 40-flowered *acute spikes; scales ovate, closely appressed, nerveless* except on the green keel. (C. Hydra, *Michx.*) — Sandy fields, Virginia and southward: probably an immigrant from farther south. Excessively troublesome to planters. (Eu.)

14. **C. phymatòdes,** Muhl. Culm (1° – 2½° high) equalling the leaves; umbel often compound, 4 – 7-rayed, much shorter than the long involucre; *spikes numerous, light chestnut or straw-color, acutish,* 12 – 30-flowered; *scales oblong, narrowly scarious-margined, nerved,* the acutish *tips rather loose;* achenium oblong. (C. repens, *Ell.*) — Low grounds, along rivers, &c., Vermont to Michigan, Illinois, and common southward. Aug. — Tubers small, at the end of very slender rootstocks: by these the plant multiplies rapidly, and becomes a pest.

+ + + *Spikes flattish, rather loosely flowered, greenish, lance-linear, capitate-clustered (except in No.* 15); *the convex ovate scales many-nerved, only* ⅓ *or* ¼ *longer than the triangular achenium: culms tufted from hard tuberiferous rootstocks.*

15. **C. Schweinitzii,** Torr. Culm rough on the angles (1° – 2° high); *leaves linear; umbel simple,* 4 – 8-*rayed; spikes crowded* at the upper part of the mostly elongated rays, *erect,* loosely 6 – 9-flowered, a bristly bract at the base of each; *scales awl-pointed,* scarcely longer than the ovate achenium; joints of the axis narrowly winged. — Dry sandy shores, &c., Lake Ontario, New York, to Illinois, and northwestward. Aug. — Spikes ¼′ – ½′ long: the scales large in proportion.

16. **C. Gràyii,** Torr. Culm thread-form, wiry (6′ – 12′ high); *leaves nearly bristle-shaped,* channelled; *umbel simple,* 4 – 6*-rayed; spikes* 5 – 10 *in a loose head, spreading,* 5 – 7-flowered, the *joints of the axis winged; scales rather obtuse,* greenish-chestnut-color; achenium obovate, minutely pointed. — Barren sandy soil, Rhode Island to New Jersey, near the coast. Aug. (Approaches the next.)

17. **C. filicúlmis,** Vahl. Culm slender, wiry, often reclined (8′ – 15′ high); *leaves linear* (1″ – 2″ wide); *spikes numerous and clustered in one sessile dense head, or in* 1 – 3 *additional looser heads on spreading rays,* 6 – 10-flowered; *joints of the axis naked; scales blunt,* greenish; achenium obovate, short-pointed. (C. mariscoides, *Ell.*) — Dry sterile soil; common, especially southward. Aug.

§ 4. MARÍSCUS, Vahl. — *Style 3-cleft: the achenium triangular: stamens* 3: *spikes* 1 *– few-flowered, scarcely flattened; the* 2 *lower scales short and empty: otherwise as in* § 3.

18. **C. ovulàris,** Torr. *Smooth;* culm sharply triangular (6′ – 12′ high); umbel 1 – 6-rayed; *spikes in globular dense heads,* 2 – 4*-flowered, short and thick:* joints of the axis winged; scales ovate, blunt, greenish; achenium obovoid. ♃ (Kyllingia, *Michx.*) — Sandy soil, S. New York to Virginia, and southward. Aug. - Oct. — Heads barely ½′ in diameter, of 50 – 100 spikes.

19. **C. retrofráctus,** Torr. Culm *minutely downy* like the leaves, rough on the obtusish angles (1° – 3° high); umbel many-rayed; *spikes slender, awl-shaped,* very numerous in obovate or oblong heads terminating the elongated rays, *soon reflexed,* 1 – 2*-flowered* in the middle; scales usually 4 or 5, the two lowest ovate and empty, the fertile lanceolate, the uppermost involute-awl-shaped; achenium linear. ♃ (Scirpus retrofractus, *L.*) — Sandy fields, New Jersey to Virginia, and southward. Aug. — Spikes ½′ long, 50 – 100 in a head, greenish.

2. KYLLÍNGIA, L. Kyllingia.

Spikes of 3 – 4 two-ranked scales, 1 – 1½-flowered; the 2 lower scales minute and empty, as in Cyperus § 4, otherwise as in Cyperus § 1 (viz. style 2-cleft; achenium lenticular): but the numerous spikes densely aggregated in solitary or triple sessile heads. Involucre about 3-leaved. (Named after *Kylling,* a Danish botanist.)

1. **K. pùmila,** Michx. Head globular or 3-lobed, whitish-green (4″ broad); spikes strictly 1-flowered; upper scales ovate, pointed, rough on the keel; stamens 2; leaves linear. — Low grounds, Ohio to Illinois, and southward. Aug. — Culms 2′ – 9′ high.

3. DULÍCHIUM, Richard. Dulichium.

Spikes many- (6 – 10-) flowered, linear, flattened, sessile in 2 ranks on axillary solitary peduncles emerging from the sheaths of the leaves. Scales 2-ranked, lanceolate. Perianth of 6 – 9 downwardly barbed bristles. Stamens 3. Style 2-cleft above. Achenium flattened, linear-oblong, beaked with the long persistent style. — A perennial herb, with a terete simple culm (1° – 2° high), jointed and leafy to the summit; the leaves short and flat, linear, 3-ranked. (The name of a Greek island; its application unexplained.)

1. **D. spathàceum,** Pers. — Borders of ponds; common. July – Sept.

4. HEMICÁRPHA, Nees. Hemicarpha.

Spikes many-flowered, ovoid, one or few in a lateral cluster, sessile. Scales regularly imbricated in many ranks, ovate or obovate. Inner scale single behind the flower, very thin, finally often adhering to or wrapped around the oblong or obovoid pointless naked achenium. Perianth none. Stamen 1. Style 2-cleft. — Little tufted annuals resembling Scirpus, except as to the minute inner scale, which is readily overlooked; the naked culms with bristle-like leaves at the base. (Name from ἥμι, *half*, and κάρφος, *straw* or *chaff*, in allusion to the single inner scalelet on one side of the flower.)

1. **H. subsquarròsa,** Nees. Dwarf (1′–4′ high); involucre 1-leaved, as if a continuation of the bristle-like culm, and usually with another minute leaf; spikes 2–3 (2″ long); scales brown, tipped with a short recurved point. (Scirpus subsquarrosus, *Muhl.*) — Sandy borders of ponds and rivers; not rare, often growing with Cyperus inflexus. July. — Var. Drummóndii (H. Drummondii, *Nees*) is a form with single and pale or greenish heads. — Illinois and southward.

5. ELEÓCHARIS, R. Brown. Spike-Rush.

Spike single, terminating the naked culm, many – several-flowered. Scales imbricated all round in many, rarely in 2 or 3, ranks. Perianth of 3–12 (commonly 6) bristles, usually rough or barbed downwards, rarely obsolete. Stamens 3. Style 2–3-cleft, its bulbous base persistent as a tubercle, which is jointed with the apex of the lenticular or obtusely triangular achenium. — Leafless, chiefly perennial, with tufted culms sheathed at the base, from matted or creeping rootstocks. (Name from ἕλος, *a marsh*, and χαίρω, *to delight in;* being marsh plants.)

§ 1. LIMNÓCHLOA, Nees. — *Scales of the dense and terete many-flowered spike papery-coriaceous and rounded, with a scarious margin, pale: style 3-cleft: achenium doubly convex, about equalling the bristles.*

* *Culms large and stout, often thicker than the cylindrical spike: scales faintly many-striate, and densely imbricated so as usually to form (five) distinct spiral rows: sheaths at the base often nearly leaf-bearing.* (Limnochloa proper.)

1. **E. equisetoìdes,** Torr. *Culm terete, knotted as if jointed by many cross partitions* (2° high, thick as a goosequill); *achenium smooth,* crowned with a conical-beaked tubercle. — Shallow water, Rhode Island (*Olney*), Michigan (*Houghton*), Delaware, and southward. — Spike 1′ or more long.

2. **E. quadrangulàta,** R. Brown. *Culm even, sharply 4-angled* (2°–4° high); *achenium finely reticulated,* crowned with a conical flattened distinct tubercle. — Penn., Michigan, and southward.

* * *Culms slender: spike ovate or oblong: scales with a midrib.*

3. **E. tuberculòsa,** R. Brown. Culms striate (8′–12′ high); bristles strongly barbed downward; *achenium triangular,* ribbed and minutely reticulated,

surmounted by a flattish cap-shaped tubercle as large as itself. — Wet sandy places, Massachusetts, along the coast, to Virginia and southward.

§ 2. ELEÓCHARIS PROPER. — *Scales of the terete several – many-flowered spike membranaceous, and with a midrib or nerve, imbricated in more than three ranks.*

* *Achenium lenticular (smooth): style 2-cleft, in No. 4 commonly 3-cleft: spike dense, many-flowered: culms rather slender, spongy.* (ELEÓGENUS, Nees.)

4. **E. obtùsa,** Schultes. Culms nearly terete, tufted (8′ – 14′ high) from fibrous roots; *spike globose-ovoid and with age oblong, obtuse* (dull brown); the *scales very obtuse and numerous* (80 – 130), *densely crowded in many ranks; style* 3- (rarely 2-) *cleft;* achenium obovate, shining, tumid-margined, about half the length of the 6 bristles, crowned with a short and *very broad flattened tubercle.* — Muddy places; everywhere common.

5. **E. olivàcea,** Torr. Culms flattish, grooved, diffusely tufted on slender matted rootstocks (2′ – 4′ high); *spike ovate, acutish,* 20 – 30-*flowered; scales ovate, obtuse,* rather loosely imbricated in many ranks (purple with a green midrib and slightly scarious margins); achenium obovate, dull, abruptly beaked with a narrow tubercle, about half the length of the 6 – 8 *bristles.* — Inundated sandy soil, Massachusetts to New Jersey near the coast, and southward.

6. **E. palústris,** R. Brown. Culms nearly terete, striate (1° – 2° high), from running rootstocks; *spike oblong-lanceolate, pointed, many-flowered; scales ovate-oblong,* loosely imbricated in several ranks, reddish-brown with a broad and translucent whitish margin and a greenish keel, the upper acutish, the lowest rounded and often enlarged; achenium obovate, somewhat shining, crowned with a short ovate or ovate-triangular flattened tubercle, shorter than the *usually* 4 *bristles.* — Var. GLAUCÉSCENS (S. glaucescens, *Willd.!*): culms slender or filiform; tubercle narrower and acute, beak-like, sometimes half the length of the achenium. — Var. CÁLVA (E. calva, *Torr.*): bristles wanting; tubercle short, nearly as in the true E. palustris, but rather narrower (Watertown, New York, *Crawe*). — Very common, either in water, when it is pretty stout and tall; or in low grassy grounds, when it is slender and lower. (Eu.)

* * *Achenium triangular: style 3-cleft: bristles sometimes few and fragile or altogether wanting.* (SCIRPÍDIUM, Nees, nearly.)

+– *Spike much broader than the filiform or slender culm: scales imbricated in several ranks, brownish or purplish with scarious whitish margins,* 1-*nerved.*

++ *Bristles* 4 – 6, *longer than the achenium, stout and bearded downward.*

7. **E. rostellàta,** Torr. *Culms flattened and striate-grooved, wiry,* erect (1° – 2° high), the sheath transversely truncate; *spike ovoid-lanceolate, acute,* 12 – 20-*flowered;* scales ovate, obtuse, rather rigid (light brown); achenium smooth, obovate-triangular, narrowed into the confluent pyramidal tubercle, which is overtopped by the 4 – 6 bristles. — Marshes, Rhode Island (*Olney*), Penn Yan, New York (*Sartwell*), and Michigan. — Allied to S. multicaulis of Eu.

8. **E. intermèdia,** Schultes. *Culms capillary, wiry,* striate-grooved, densely tufted from fibrous roots, *diffusely spreading or reclining* (6′ – 12′ long); *spike oblong-ovate, acutish, loosely* 10 – 18-*flowered* (2″ – 3″ long); scales oblong, obtuse, green-keeled, the sides purplish-brown; achenium smooth, obovoid with

a narrowed base, beaked with a slender conical-awl-shaped distinct tubercle, which nearly equals the 6 bristles. (E. reclinata, *Kunth!*) — Wet slopes; common northward.

↔ ↔ *Bristles 2 – 4, shorter than the achenium and fragile, or none.*

9. **E. ténuis,** Schultes. *Culms almost capillary, erect, sharply 4-angular* (1° high), the sides concave; *spike elliptical, acutish, 20 – 30-flowered* (3'' long); *scales ovate, obtuse,* chestnut-purple with a broad scarious margin and green keel; *achenium obovate, roughened with close and fine projecting dots, crowned with a small depressed tubercle;* bristles 2 – 3, half the length of the achenium, or wanting. (E. elliptica, *Kunth!*) — Wet meadows and bogs; common.

10. **E. compréssa,** Sullivant. *Culms flat,* strongly striate, slender, erect (1½° high); *spike ovate-oblong, 20 – 30-flowered* (4'' long); *scales lanceolate-ovate, acute,* dark purple with broad white pellucid margins and summit, *the latter 2-cleft; achenium obovate-pear-shaped,* obtusely 3-angled, *obscurely wrinkled-pitted, crowned with a small globular-conical tubercle;* bristles none (rarely a single rudiment). — Wet places, N. New York, Ohio, and Illinois. — Culms tufted on running rootstocks, ½'' broad, strikingly flat, spirally twisted in drying.

11. **E. melanocárpa,** Torr. *Culms flattened,* grooved, wiry, erect (9' – 18' high); *spike cylindrical-ovoid or oblong, thick,* obtuse, densely many-flowered (3'' – 6'' long); scales roundish-ovate, very obtuse, brownish with broad scarious margins; *achenium smooth, obovate-top-shaped, obtusely triangular, the broad summit entirely covered like a lid by the flatly depressed tubercle,* which is raised in the centre into a short abrupt triangular point; bristles 3 or 4, shorter than the (soon blackish) achenium, fragile, often obsolete. — Wet sand, Plymouth, Massachusetts, to Virginia, and southward along the coast. Scales closely many-ranked, as in the first division of § 2.

12. **E. tricostàta,** Torr. *Culms flattish,* thread-like (1° – 2° high); *spike cylindrical-oblong,* densely many-flowered (6'' – 9'' long), thickish; scales ovate, very obtuse, rusty brown, with broad scarious margins; *achenium obovate, with 3 prominent thickened angles, minutely rough-wrinkled, crowned with a short-conical acute tubercle;* bristles none. — Quaker Bridge, New Jersey (*Knieskern*), and southward.

+ + *Spike lance-linear, scarcely broader than the sharply triangular culm: scales few-ranked, greenish, finely several-nerved on the keeled back.*

13. **E. Robbínsii,** Oakes. *Flower-bearing culms exactly triangular,* rather stout, erect (8' – 2° high), also producing tufts of capillary abortive stems, like fine leaves, which float in the water; sheath obliquely truncate; scales of the pointed spike 3 – 9, convolute-clasping, lanceolate, obtuse, with scarious margins; achenium oblong-obovate, 3-angular, minutely reticulated, about half the length of the 6 downwardly-barbed strong bristles, tipped with a flattened awl-shaped tubercle. — Shallow water, from Pondicherry Pond, New Hampshire (*Robbins*), to Rhode Island, *Thurber*, &c. — Spike varying from ½' to 1' long, by 1'' wide; the long scales being rather remote and sheath-like.

§ 3. CHÆTOCYPÈRUS, Nees. — *Scales of the compressed few – several-flowered spike membranaceous, 2 – 3-ranked: bristles 3 – 6, fragile or fugacious: style 3-cleft. achenium triangular or somewhat terete: culms small and capillary.*

* *Achenium obscurely triangular, many-ribbed on the sides.*

14. **E. aciculàris,** R. Brown. Culms finely capillary (2′–8′ long), more or less 4-angular; spike 3–9-flowered; scales ovate-oblong, rather obtuse (greenish with purple sides); achenium obovate-oblong, tumid, with 3 ribbed angles and 2–3 times as many smaller intermediate ribs, also transversely striate, longer than the 3–4 very fugacious bristles; tubercle conical-triangular. (S. trichodes, *Muhl.*, &c.) — Muddy places, and margins of brooks; common. (Eu.)

* * *Achenium triangular, with smooth and even sides.*

15. **E. pygmæ̀a,** Torr. Culms bristle-like, flattened and grooved (1′–2′ high); *spike ovate, 3–8-flowered;* scales ovate (greenish), the upper rather acute; achenium ovoid, acutely triangular, smooth and shining, tipped with a minute tubercle; bristles mostly longer than the fruit, sometimes wanting. (S. pusillus, *Vahl.?* Chætocyperus polymorphus, *Nees?*) — Brackish marshes and river-banks, as far as salt water reaches.

16. **E. microcárpa,** var.? **filicúlmis,** Torr. "Culms capillary or thread-like, wiry, 4-angular (3′–4′ high); *spikes oblong, often proliferous, 15–25-flowered;* bristles nearly as long as the obovate-oblong (obtusely triangular) nut without the tubercle; scales dark chestnut-color." — Wet places, in the pine barrens of New Jersey, *Torrey.*

6. SCÍRPUS, L. BULRUSH. CLUB-RUSH.

Spikes many–several-flowered, terete, single or mostly clustered, and subtended by one or more involucral leaves, often appearing lateral from the extension of an involucral leaf like a continuation of the culm. Scales regularly imbricated all round in several ranks. Perianth of 3–6 bristles. Stamens mostly 3. Style 2–3-cleft, simple, not bulbous at the base, wholly deciduous, or leaving a persistent jointless base as a tip or point to the lenticular or triangular achenium. — Culms sheathed at the base; the sheaths usually leaf-bearing. Perennials, except No. 8. (The Latin name of the Bulrush.)

§ 1. SCIRPUS PROPER. — *Bristles rigid, not exserted, mostly barbed downwards.*

* *Spike single, terminal, with an empty scale or bract at its base equalling or overtopping it, few-flowered: culms slender, jointless, leaf-bearing only at the base (style 3-cleft: achenium triangular, smooth).*

1. **S. cæspitòsus,** L. *Culms terete,* wiry, densely sheathed at the base, in compact turfy tufts (3′–10′ high); the upper sheath prolonged into a *short awl-shaped leaf;* spike ovoid, rusty-color; the 2 lower scales bract-like, callous-pointed, and as long as the spike; *bristles* 6, *smooth,* longer than the abruptly short-pointed achenium. — Alpine tops of the mountains of Maine, New Hampshire, and N. New York. Also high mountains of Virginia? (Eu.)

2. **S. planifòlius,** Muhl. *Culms triangular,* loosely tufted (5′–10′ high), leafy at the base; *leaves linear, flat, as long as the culm,* rough on the edges and keel, as is the culm; spike ovate or oblong, rusty-color; scales ovate, with a strong green keel prolonged into an awned tip, the lowest about as long as the spike; *bristles* 4–6, *upwardly hairy,* as long as the blunt achenium. — Dry or moist woods, Delaware to New England. June.

3. **S. subterminàlis,** Torr. *Culms* (1°-3° long) *and slender terete leaves immersed* and cellular; *spike overtopped by a green bract,* which appears like a prolongation of the culm, oblong, raised out of the water; scales scarcely pointed; *bristles* 6, *bearded downwards,* rather shorter than the abruptly-pointed achenium. — Slow streams and ponds, New Jersey and New England to Michigan, and westward. Aug.

* * *Spikes clustered (rarely reduced to one), appearing lateral by the extension of the one-leaved involucre exactly like a continuation of the naked culm.*

+- *Culm triangular, stout, chiefly from running rootstocks: spikes many-flowered, rusty brown, closely sessile in one cluster: sheaths at base more or less leaf-bearing.*

4. **S. pùngens,** Vahl. *Culm sharply 3-angled* throughout (1°-4° high), with concave sides; *leaves* 1-3, *elongated* (4′-10′ long), keeled and channelled; spikes 1-6, capitate, ovoid, long overtopped by the pointed involucral leaf; scales ovate, sparingly ciliate, 2-cleft at the apex and awl-pointed from between the acute lobes; *anthers tipped with an awl-shaped minutely fringed appendage; style 2-cleft;* bristles 2-6, shorter than the obovate plano-convex and mucronate smooth achenium. (S. triqueter, *Michx.*, not of *L.* S. Americanus, *Pers.*) — Borders of salt and fresh ponds and streams. July, Aug. — This is the species generally used for making rush-bottom chairs. (Eu.)

5. **S. Ólneyi,** Gray. *Culm 3-wing-angled, with deeply excavated sides,* stout (2°-7° high), the *upper sheath bearing a short 3-angular leaf or none,* spikes 6-12, closely capitate, ovoid, obtuse, overtopped by the short involucral leaf; scales orbicular, smooth, the inconspicuous mucronate point shorter than the scarious apex; *anthers with a very short and blunt minutely bearded tip; style 2-cleft;* bristles 6, scarcely equalling the obovate plano-convex mucronate achenium. — Salt marshes, Martha's Vineyard, *Oakes,* Rhode Island, *Olney,* and New Jersey, *Knieskern;* also southward. July. — Cross-section of the stem strongly 3-rayed, with the sides parallel. — Much nearer than the last to the European *S. triqueter,* which has similar anthers and an abbreviated or almost abortive leaf; but its culm is wingless, and the cluster of spikes compound, some of them umbellate-stalked.

6. **S. Tórreyi,** Olney. *Culm 3-angled,* with concave sides, rather slender (2° high), *leafy at the base; leaves* 2-3, *more than half the length of the culm,* triangular-channelled, slender; *spikes* 1-4, *ovate-oblong, acute, distinct,* sessile, long overtopped by the slender erect involucral leaf; scales ovate, smooth, entire, barely mucronate; *style 3-cleft; bristles longer than the unequally triangular obovate very smooth and long-pointed achenium.* (S. mucronatus, *Pursh? Torr. Fl. N. Y.*) — Borders of ponds, both brackish and fresh, New England to Michigan. July, Aug. — (S. mucronatus, *L.*, should it be found in the country, will be known by its leafless sheaths, conglomerate head of many spikes, stout involucral leaf bent to one side, &c.)

+- +- *Culm terete, naked.*

7. **S. lacústris,** L. (Bulrush.) Culm large, cylindrical, gradually tapering at the apex (3°-8° high), the sheath bearing a small linear-awl-shaped leaf or none; *spikes* ovate-oblong, *numerous, in a compound umbel-like panicle turned to one side,* rusty-brown; scales ovate, mucronate; bristles 4-6; achenium

obovate, mucronate, plano-convex. — Our plant appears constantly to have a 2-cleft style, and the scales often a little downy on the back, and is S. validus, *Vahl.* & S. acutus, *Muhl.* — Fresh-water ponds and lakes; common. July. — Culm as thick as the finger at the base, tipped with an erect and pointed involucral leaf, which is shorter or longer than the panicle. (Eu.)

8. **S. débilis,** Pursh. Culms slender (6′–12′ high), striate, tufted, from fibrous roots, leafless, or 1-leaved at the base; *spikes ovate, few* (1–8) *in a sessile cluster, appearing deeply lateral* by the prolongation of the 1-leaved involucre; scales round-ovate (greenish-yellow); style 2–3-cleft; bristles 4–6, longer than the obovate plano-convex or lenticular shining minutely dotted achenium, or rarely obsolete. ① — Low banks of streams, Massachusetts to Michigan, Illinois, and southward. Aug.

* * * *Spikes clustered and mostly umbelled, plainly terminal, many-flowered: involucre leafy: culm leafy, triangular, and with closed joints below (style 3-cleft).*

+ *Scales of the large spikes awl-pointed, lacerate-3-cleft at the apex.*

9. **S. marítimus,** L. (Sea Club-Rush.) Leaves flat, linear, as long as the stout culm (1°–3° high), those of the involucre 1–4, very unequal; spikes few–several in a sessile cluster, and often also with 1–4 unequal rays bearing 1–3 ovate or oblong-cylindrical (rusty brown) spikes; *achenium obovate-orbicular, much compressed, flat on one side, convex or obtuse-angled on the other, minutely pointed, shining, longer than the* 1–6 unequal and deciduous (sometimes obsolete) *bristles.* — Var. MACROSTÁCHYOS, Michx. (S. robústus, *Pursh.*) is a larger form, with very thick oblong or cylindrical heads, becoming 1′–1½′ long, and the longer leaf of the involucre often 1° long. — Salt marshes; common on the coast, and near salt springs (Salina, New York), &c. Aug. — Heads beset with the spreading or recurved short awns which abruptly tip the scales. (Eu.)

10. **S. fluviátilis.** (River Club-Rush.) Leaves flat, broadly linear (½′ or more wide), tapering gradually to a point, the upper and those of the very long involucre very much exceeding the *compound umbel; rays* 5–9, *elongated, recurved-spreading,* bearing 1–5 ovate or oblong-cylindrical acute heads; *achenium obovate, sharply and exactly triangular, conspicuously pointed, opaque,* scarcely equalling the 6 rigid bristles. (S. marit., var.? fluviatilis, *Torr.*, excl. syn. *Ell.*) — Borders of lakes and large streams, W. New York to Wisconsin and Illinois. July, Aug. — Culm very stout, sharply triangular, 3°–4° high. Leaves roughish on the margin, like the last; those of the umbel 3–7, the largest 1°–2° long. Principal rays of the umbel 3′–4′ long, sheathed at the base. Heads ¾′ to 1¼′ long, paler and duller than in No. 9; the scales less lacerate and the awns less recurved; the fruit larger and very different.

+ + *Scales of the small compound-umbelled and clustered heads mucronate-tipped.*

11. **S. sylváticus,** L. Culm leafy (2°–5° high); leaves broadly linear, flat, rough on the edges; umbel cymose-decompound, irregular; the numerous spikes clustered (3–10 together) in dense heads, ovoid, *dark lead-colored or olive-green turning brownish; bristles* 6, *downwardly barbed their whole length, straight,* scarcely longer than the convex-triangular achenium. — Low grounds, N. New England and northward. — Var. ATRÓVIRENS (S. atrovirens, *Muhl.*) is a form with the spikes (10–30 together) conglomerate into denser larger heads. — Wet

meadows, &c., New England to Pennsylvania, Kentucky, Wisconsin, and northward. July. (Eu.)

12. **S. polyphýllus,** Vahl. Culm, umbel, &c. as in the last; *spikes* clustered in heads of 3–8, ovoid, becoming cylindrical with age, *yellowish-brown; bristles* 6, *usually twice bent, soft-barbed towards the summit only*, about twice the length of the achenium.* (S. exaltatus, *Pursh.* S. brunnéus, *Muhl.*) — Swamps and shady borders of ponds, W. New England to Illinois, and southward. July. — Intermediate in character between the last and the next.

§ 2. TRICHÓPHORUM, Richard. — *Bristles capillary, tortuous and entangled, naked, not barbed, much longer than the* (*triangular*) *achenium, when old projecting beyond the rusty-colored scales.* (*Leaves, involucre, &c. as in the last species.*)

13. **S. lineàtus,** Michx. Culm triangular, leafy (1°–3° high); leaves linear, flat, rather broad, rough on the margins; umbels terminal and axillary, loosely cymose-panicled, drooping, the terminal with a 1–3-leaved *involucre much shorter than the long and slender rays;* spikes oblong, becoming cylindrical, on thread-like drooping pedicels; *bristles at maturity scarcely exceeding the* ovate green-keeled and *pointed scales;* achenium sharp-pointed. — Low grounds, W. New England to Wisconsin, and southward. July.

14. **S. Erióphorum,** Michx. (Wool-Grass.) Culm nearly terete, very leafy (2°–5° high); leaves narrowly linear, long, rigid, those of the *involucre* 3–5, *longer than the decompound cymose-panicled umbel*, the rays at length drooping; spikes exceedingly numerous, ovate, clustered, or the lateral pedicelled, woolly at maturity; the rusty-colored *bristles much longer than the pointless scales;* achenium short-pointed. (Eriophorum cyperinum, *L.*) — Var. cyperìnus (S. cyperinus, *Kunth*) is the form with nearly all the spike conglomerate in small heads. Var. láxus (S. Eriophorum, *Kunth*) has the heads scattered, the lateral ones long-pedicelled. Various intermediate forms occur, and the umbel varies greatly in size. — Wet meadows and swamps; common northward and southward. July–Sept.

7. ERIÓPHORUM, L. Cotton-Grass.

Spikes many-flowered. Scales imbricated all round in several ranks. Perianth woolly, of numerous (rarely 6) flat and delicate hair-like bristles much longer than the scales, persistent and forming a silky or cotton-like usually white tuft in fruit. Stamens 1–3. Style (3-cleft) and achenium as in Scirpus. Perennials. (Name from ἔριον, *wool* or *cotton*, and φορά, *bearing*.)

* *Bristles of the flower only 6, crisped, white; spike single: small, involucre none.*

1. **E. alpìnum,** L. Culms slender, many in a row from a running rootstock (6′–10′ high), scabrous, naked; sheaths at the base awl-tipped. — Cold peat-bogs, New England to Penn., Wisconsin, and far northward. May, June. (Eu.)

* * *Bristles very numerous, long, not crisped, forming dense cottony heads in fruit.*

+ *Culm bearing a single spike: involucre none: wool silvery white.*

2. **E. vaginàtum,** L. Culms in close tufts (1° high), leafy only at the

base, and with 2 inflated leafless sheaths; root-leaves long and thread-form, triangular-channelled; scales of the ovate spike long-pointed, lead-color at maturity. — Cold and high peat-bogs, New England to Wisconsin, and northward; rare. June. (Eu.)

+- +- *Culm leafy, bearing several umbellate-clustered heads, involucrate.*

3. **E. Virgínicum,** L. Culm rigid (2°–4° high); leaves narrowly linear, elongated, flat; *spikes crowded in a dense cluster or head; wool rusty or copper-color,* only thrice the length of the scale; stamen 1. — Bogs and low meadows; common. July, Aug.

4. **E. polystàchyon,** L. Culm rigid (1°–2° high), obscurely triangular; *leaves linear, flat, or barely channelled below,* triangular at the point; *involucre 2–3-leaved;* spikes several (4–12), on nodding peduncles, some of them elongated in fruit; achenium obovate; *wool white,* very straight (1′ long or more). — Var. ANGUSTIFÒLIUM (E. angustifolium, *Roth,* and European botanists, not of American, and the original E. polystachyon of *L.*) has *smooth peduncles.* — Var. LATIFÒLIUM (E. latifolium, *Hoppe,* & E. polystachyon, *Torr., &c.*) has rough peduncles, and sometimes broader and flatter leaves. — Both are common in bogs, especially northward, and often with the peduncles obscurely scabrous, indicating that the species should probably be left as Linnæus founded it. June, July. (Eu.)

5. **E. grácile,** Koch. Culm slender (1°–2° high), rather triangular; *leaves slender, channelled-triangular,* rough on the angles; *involucre short and scale-like, mostly 1-leaved;* peduncles rough or roughish-pubescent; achenium elliptical-linear. (E. triquetrum, *Hoppe.* E. angustifolium, *Torr.*) — Cold bogs, New England to Illinois, and northward. July, Aug. — Spikes 3–7, small, when mature the copious white wool ½′ to ¾′ long. Scales brownish, several-nerved, or in our plant, var. PAUCINÉRVIUM, Engelm., mostly light chestnut-color, and about 3-nerved. (Eu.)

8. FIMBRÍSTYLIS, Vahl. (Species of SCIRPUS, *L.*)

Spikes several–many-flowered, terete; the scales all floriferous, regularly imbricated in several ranks. Perianth (bristles, &c.) none. Stamens 1–3. Style 2–3-cleft, with a thickened bulbous base, which is deciduous (except in No. 4) from the apex of the naked lenticular or triangular achenium. Otherwise as in Scirpus. — Culms leafy at the base. Spikes in our species umbelled, and the involucre 2–3-leaved. (Name compounded of *fimbria,* a fringe, and *stylus,* the style, which is fringed with hairs in the genuine species.)

§ 1. FIMBRISTYLIS PROPER. — *Style 2-cleft, mostly flat and ciliate on the margins, falling away with the bulbous base from the lenticular achenium; scales of the many-flowered spike very closely imbricated.*

1. **F. spadícea,** Vahl. Culms (1°–2½° high) naked above, *rigid,* as are the *thread-form convolute-channelled leaves,* smooth; spikes ovate-oblong becoming cylindrical, dark chestnut-color (2″ thick); *stamens 2 or 3; achenium minutely striate and dotted.* ♃ (F. cylindrica, *Vahl.*) — Salt marshes along the coast, New York to Virginia, and southward. July – Sept.

2. **F. láxa,** Vahl. Culms slender (2′–12′ high), *weak*, grooved and flattish; *leaves linear, flat, ciliate-denticulate, glaucous*, sometimes hairy; spikes ovate, acute (3″ long); *stamen* 1; *achenium* 6–8*-ribbed on each side, and with finer cross lines*. ① (F. Baldwiniana, *Torr.* F. brizoides, *Nees*, &c.) — Low, mostly clayey soil, Penn. to Illinois, and southward. July – Sept.

§ 2. TRICHELÓSTYLIS, Lestib. — *Style 3-cleft: achenium triangular: otherwise nearly as in* § 1.

3. **F. autumnàlis,** Rœm. & Schult. Low (3′–9′ high), in tufts; culms flat, slender, diffuse or erect; leaves flat, acute; umbel compound; spikes oblong, acute (1″–2″ long) single or 2–3 in a cluster; the scales ovate-lanceolate, mucronate; stamens 1–3. ① (Scirpus autumnalis, *L.*) — Low grounds, Maine to Illinois, and southward. Aug. – Oct.

§ 3. ONCÓSTYLIS, Martius. — *Style 3-cleft, slender, its small bulb more or less persistent on the apex of the triangular achenium.*

4. **F. capíllaris.** Low, densely tufted (3′–9′ high); culm and leaves nearly capillary, the latter all from the base, short; umbel compound or panicled; spikes (2″ long) ovoid-oblong; stamens 2; achenium minutely wrinkled, very obtuse. ① (Scirpus, *L.*) — Sandy fields, &c., common, especially southward. Aug. – Sept.

9. FUIRÈNA, Rottböll. UMBRELLA-GRASS.

Spikes many-flowered, terete, clustered or solitary, axillary and terminal. Scales imbricated in many ranks, awned below the apex, all floriferous. Perianth of 3 ovate or heart-shaped petaloid scales, mostly on claws, and usually with as many alternate small bristles. Stamens 3. Style 3-cleft. Achenium triangular, pointed with the persistent base of the style. Culms obtusely angular. (Named for *G. Fuiren*, a Danish botanist.)

1. **F. squarròsa,** Michx. Stem (1°–2° high) leafy; leaves and sheaths hairy; spikes ovoid-oblong (½′ long), clustered in heads, bristly with the spreading awns of the scales; perianth-scales ovate, awn-pointed, the interposed bristles minute. — Var. PÙMILA, *Torr.* is a dwarf form, 1′–6′ high, with 2–6 spikes; perianth-scales ovate-lanceolate and oblanceolate. ♃ — Sandy wet places, Massachusetts to Virginia, and southward; also Michigan; northward mostly the small variety. Aug.

10. PSILOCÀRYA, Torr. BALD-RUSH.

Spikes ovoid, terete, many-flowered; the flowers all perfect. Scales imbricated in several ranks; the lower ones empty. Perianth none. Stamens usually 2. Style 2-cleft. Achenium doubly convex, more or less wrinkled transversely, crowned with the persistent tubercle or dilated base of the style. — Culms leafy; the spikes in terminal and axillary cymes. (Name from ψιλός, *bare*, and καρύα, *nut*, alluding to the absence of bristles.)

1. **P. scirpoìdes,** Torr. Spikes 20–30-flowered; scales oblong-ovate, acute, chestnut-colored; achenium obscurely wrinkled, beaked with the sword

shaped persistent style, and somewhat margined; culm 4′–9′ high: leaves flat. ① — Inundated places, Rhode Island and Plymouth, Massachusetts. July.

11. DICHRÒMENA, Richard. DICHROMENA.

Spikes terete, flattened, aggregated in a terminal leafy involucrate head, many-flowered; some of the flowers imperfect. Perianth none. Stamens 3. Style 2-cleft. Achenium lenticular, wrinkled transversely, crowned with the broad tubercled base of the style. — Culms leafy, from creeping rootstocks; the leaves of the involucre mostly white at the base (whence the name, from *δὶς*, *double*, and *χρῶμα*, *color*).

1. **D. leucocéphala,** Michx. Culm triangular; leaves narrow; involucre 5–7-leaved; achenium truncate, not margined. ♃ — Damp pine barrens of New Jersey to Virginia and southward. August.

12. CERATOSCHŒNUS, Nees. HORNED RUSH.

Spikes spindle-shaped, producing 1 perfect and 1 to 4 staminate flowers. Scales few and loosely imbricated; the lower ones empty. Perianth of 5–6 rigid or cartilaginous flattened bristles, which are somewhat dilated or united at the base. Stamens 3. Style simple, entirely hardening in fruit into a long and slender awl-shaped upwardly roughened beak with a narrow base, much exserted, and several times longer than the flat and smooth obovate achenium. — Perennials, with triangular leafy culms, and large spikes clustered in simple or compound terminal and axillary cymes. (Name composed of *κέρας*, *a horn*, and *σχοῖνος*, *a rush*.)

1. **C. corniculàta,** Nees. *Cymes decompound, diffuse; bristles awl-shaped,* stout, unequal, *shorter than the achenium.* — Wet places, Penn. to Illinois, and southward. August. — Culm 3°–6° high. Leaves ½′ wide. Fruit with the taper beak 1′ long.

2. **C. macrostàchya,** Gray. *Cymes somewhat simple,* small, the spikes closely clustered; *bristles capillary, twice the length of the achenium.* — Borders of ponds, E. Massachusetts, Rhode Island, New Jersey, and rare southward. (Some states occur intermediate between this and the last.)

13. RHYNCHÓSPORA, Vahl. BEAK-RUSH.

Spikes ovate, few–several-flowered; the lower of the loosely imbricated scales empty, the uppermost usually with imperfect flowers. Perianth of 6 (or rarely more) bristles. Stamens mostly 3. Style 2-cleft. Achenium lenticular or globular, crowned with the dilated and persistent base of the style (tubercle). — Perennials, with more or less triangular and leafy culms; the small spikes in terminal and axillary clusters, cymes, or heads: flowering in summer. (Name composed of *ῥύγχος*, *a snout*, and *σπορά*, *a seed*, from the beaked achenium.)

* *Achenium transversely wrinkled, more or less flattened, bristles upwardly denticulate.*

1. **R. cymòsa,** Nutt. *Culm triangular; leaves linear* (¼′ wide); cymes corymbose; the *spikes crowded and clustered; achenium round-obovate,* twice the

length of the bristles, four times the length of the depressed-conical tubercle. — Low grounds, New Jersey to Virginia, and southward.

2. **R. Torreyàna,** Gray. *Culm nearly terete, slender; leaves bristle-form;* cymes panicled, somewhat loose, the *spikes mostly pedicelled; achenium oblong-obovate,* longer than the bristles, thrice the length of the broad compressed-conical tubercle. — Swamps; pine barrens of New Jersey, and southward.

3. **R. inexpánsa,** Vahl. *Culm triangular,* slender; *leaves narrowly linear; spikes spindle-shaped, mostly pedicelled, in drooping panicles; achenium oblong,* half the length of the slender bristles, twice the length of the triangular-subulate tubercle. — Low grounds, Virginia and southward.

* * *Achenium smooth and even, lenticular.*

+ *Bristles of the perianth denticulate or barbed upwards.*

4. **R. fúsca,** Rœm. & Schultes. *Leaves bristle-form, channelled;* spikes ovate-oblong, few, clustered in 1 - 3 loose heads (dark chestnut-color); *achenium obovate, half the length of the bristles,* about the length of the triangular-sword-shaped acute tubercle, which is rough-serrulate on the margins. — Low grounds, New Jersey to New Hampshire: rare. July. — Culm 6′ - 12′ high. (Eu.)

5. **R. gracilénta,** Gray. *Leaves narrowly linear;* spikes ovoid, in 2 - 4 small clusters, the lateral long-peduncled; *achenium ovoid, rather shorter than the bristles,* about the length of the flattened awl-shaped tubercle. — Low grounds, S. New York, New Jersey, and southward. — Culm very slender, 1° - 2° high.

+ + *Bristles denticulate or barbed downwards (in No. 9 both ways).*

6. **R. álba,** Vahl. *Leaves almost bristle-form; spikes (whitish) several in a corymbed cluster, lanceolate; achenium* ovoid, narrowed at the base, *shorter than the* 9 - 11 *bristles,* a little longer than the slender beak-like tubercle; *stamens usually only* 2. — Bogs; common eastward (both north and south) and northward. — Culm slender, 12′ - 20′ high. (Eu.)

7. **R. capillàcea,** Torr. *Leaves bristle-form; spikes* 3 - 6 *in a terminal cluster,* and commonly 1 or 2 on a remote axillary peduncle, *oblong-lanceolate* (pale chestnut-color, ¼′ long); *achenium oblong-ovoid,* stipitate, very obscurely wrinkled, about *half the length of the* 6 *stout bristles,* and twice the length of the lanceolate-beaked tubercle. — Bogs and rocky river-banks, Pennsylvania to New York and Michigan. — Culm 6′ - 9′ high, slender.

8. **R. Knieskérnii,** Carey. *Leaves narrowly linear,* short; *spikes numerous, crowded in* 4 - 6 *distant clusters, oblong-ovate* (chestnut-color, scarcely 1″ long); *achenium obovate,* narrowed at the base, *equalling the* 6 *bristles,* twice the length of the triangular flattened tubercle. — Pine barrens of New Jersey, on bog iron-ore banks exclusively (*Knieskern*), and southward; rare. — Culms tufted, 6′ - 18′ high, slender.

9. **R. glomeràta,** Vahl. *Leaves linear, flat; spikes numerous in distant clusters or heads* (which are often in pairs from the same sheath), *ovoid-oblong* (chestnut-brown); achenium obovate, margined, narrowed at the base, as long as the lance-awl-shaped flattened tubercle, which equals the (always) *downwardly barbed bristles.* — Low grounds, Maine to Kentucky, and southward. — Culm 1° - 2° high. — A state with small panicled clusters is R. paniculata, *Gray.*

10. **R. cephalántha,** Torr. *Leaves narrowly linear, flat, keeled; spikes very numerous, crowded in 2 – 3 or more dense globular heads* which are distant (and often in pairs), *oblong-lanceolate*, dark brown; achenium orbicular-obovate, margined, narrowed at the base, about as long as the awl-shaped beak, half the length of the stout *bristles*, which are *barbed either downwards or upwards.* — Sandy swamps, Long Island to New Jersey, and southward. — Culm stout, 2° - 3° high: the fruit, &c. larger than in the last, of which very probably it is only a marked variety.

14. CLÀDIUM, P. Browne. Twig-Rush.

Spikes ovoid or oblong, of several loosely imbricated scales; the lower ones empty, one or two above bearing a staminate or imperfect flower; the terminal flower perfect and fertile. Perianth none. Stamens 2. Style 2 - 3-cleft, deciduous. Achenium ovoid or globular, somewhat corky at the summit, or pointed, without any proper tubercle. — Perennials, with the aspect of Rhynchospora. (Name from κλάδος, a *twig* or *branch*, perhaps on account of the branching styles of some species.)

1. **C. mariscoìdes,** Torr. Culm obscurely triangular (1° - 2° high); leaves narrow, channelled, scarcely rough-margined; cymes small; the spikes clustered in heads 3 - 8 together on 2 - 4 peduncles; style 3-cleft. (Schœnus, *Muhl.*) — Bogs, New England to Penn., Ohio, and northward. July.

15. SCLÈRIA, L. Nut-Rush.

Flowers monœcious; the fertile spikes 1-flowered, usually intermixed with clusters of few-flowered staminate spikes. Scales loosely imbricated, the lower ones empty. Stamens 1 - 3. Style 3-cleft. Achenium globular, stony, bony, or enamel-like in texture. Bristles, &c. none. — Perennials, with triangular leafy culms. (Name σκληρία, *hardness*, from the bony or crustaceous fruit.)

* *Achenium smooth and polished: its base surrounded by an obscurely triangular crustaceous ring or disk: stamens 3.*

1. **S. triglomeràta,** Michx. Culm (2° - 3° high) and broadly linear leaves roughish; fascicles of spikes few, terminal and axillary, in triple clusters, the lower peduncled; achenium ovoid-globular, slightly pointed (2″ broad). — Low grounds, Vermont to Wisconsin, &c.; common southward. July.

* * *Achenium reticulated, seated on a flattish disk of 3 conspicuous and ovate-lanceolate entire scale-like lobes: stamens 2.*

2. **S. reticulàris,** Michx. Culms slender (1° high); leaves narrowly linear; clusters loose, axillary and terminal, sessile or short-peduncled; *achenium globular, deeply pitted between the regular reticulations, not hairy.* — Sandy swamps, Eastern Massachusetts to New Jersey, Virginia, and southward: rare. August.

3. **S. láxa,** Torr. Culms slender and weak (1° - 2° high); leaves linear; clusters loose, the lower mostly long-peduncled and drooping; *achenium globular, pitted and somewhat spirally marked with minutely hairy wrinkles.* — Sandy swamps, Long Island, New Jersey, and southward, near the coast. Too like the last.

* * * *Achenium warty-roughened, but shining and white: disk a narrow ring supporting 6 minute rounded tubercles, in pairs: stamens 3.*

4. **S. pauciflòra,** Muhl. Somewhat downy or smoothish; culms slender (9′–18′ high); leaves narrowly linear; clusters few-flowered, the lower lateral ones when present peduncled; bracts ciliate. — Swamps and hills, S. and W. New England, W. New York, and southward. July.

* * * * *Disk none: achenium white, rough with minute tubercles: stamens 1–2.*

5. **S. verticillàta,** Muhl. Smooth; culms simple and slender (6′–10′ high), terminated by an interrupted spike of 4–6 rather distant sessile clusters; bracts minute; leaves linear; achenium globular (small). — Swamps, Yates County, New York (*Sartwell*), Michigan (*Cooley*), Pennsylvania (*Muhlenberg*), Ohio (*Lesquereux*), and southward. June.

16. CÀREX, L. Sedge.*

Staminate and pistillate flowers separated (*monœcious*), either borne together in the same spike (*androgynous*), or in separate spikes on the same stem, very rarely on distinct plants (*diœcious*). Scales of the spikes 1-flowered, equally imbricated around the axis. Stamens 3, rarely 2. Ovary enclosed in an inflated sac (composed of two inner scales (bractlets) united at their margins), forming a rounded or angular bladdery fruit (*perigynium*), contracted towards the apex, enclosing the lenticular, plano-convex, or triangular achenium, which is crowned with more or less of the persistent (rarely jointed) base of the style. Stigmas 2–3, long, projecting from the orifice of the perigynium. — Perennial herbs, chiefly flowering in April or May, frequently growing in wet places, often in dense tufts. Culms triangular, bearing the spikes in the axils of green and leaf-like or scale-like bracts; commonly with thin membranaceous sheaths at the base which enclose more or less of the stalks of the spikes. Leaves grassy, usually rough on the margins and keel. (A classical name, of obscure signification; derived by some from *careo*, to want, the upper spikes being mostly sterile; and by others from *κείρω*, *to cut*, on account of the sharp leaves.)

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* Contributed by John Carey, Esq., with the subjoined explanatory note.

"In arranging the Carices for your work, I have had constantly in view the species comprehended within your geographical range, and have framed the sections and subsections with especial reference to these, without regard to other excluded species belonging, in many cases, to the same groups, but exhibiting peculiarities which would require the combining characters to be modified or changed. Indeed, most of my subsections would, in a monograph of the genus, require to stand as distinct sections, with appropriate subdivisions. I have thought it an assistance to the student to give a leading name to the principal groups, and in some cases have adopted those already suggested by different authors; but as I am uncertain whether the characters on which I rely are in accordance with their views, I have cited no authorities under such subsections. I have endeavored to bring the allied groups (as I understand them) as nearly together as I could; but this, of course, is not always practicable in any lineal arrangement. It might, however, have been done with much greater satisfaction on a larger and more comprehensive scale. I have retained the small *artificial* group Psyllophoræ, from its manifest convenience, but should not have done so in a more philosophical work. Upon the whole, I am inclined to hope that the present will at least possess this one advantage over the hitherto more artificial arrangement in general use, — that a student, when acquainted with one species of a group, will be enabled to recognize the co-species for himself, whilst a merely artificial enumeration must at times place very incongruous forms in juxtaposition. Any increased difficulty, if such there be, in commencing the study of this vast and intricate genus upon principles of *natural* classification, will be amply repaid by the more accurate knowledge of structure thus obtained, than by a reliance merely on the loose external characters derived from the number and position of the spikes. I shall be well satisfied if my attempt shall be an assistance to others in doing far better, hereafter." Ed. 1. — The additions and alterations in the present edition are mainly from notes obligingly furnished by Mr. Carey.

ABRIDGED SYNOPSIS OF THE SECTIONS.

A. Spike solitary, simple, diœcious or androgynous: bracts small, colored and scale-like. — (This division, retained for the convenience of students, is merely artificial, and combines species having no real natural affinity.) — PSYLLOPHORÆ, Loisel.

§ 1. Spike diœcious, or with a few staminate flowers at its base. No. 1 - 3.

2. Spike androgynous, staminate at the summit. No 4 - 7.

B. Spike solitary, single, androgynous, staminate at the summit: bracts and scales of the fertile flowers green and leaf-like. Stigmas 3. — PHYLLOSTACHYS, Torr. & Gr. No. 8 - 10.

C. Spikes several or numerous, androgynous (occasionally diœcious in No. 11 and 33), sessile, forming compact, or more or less interrupted, sometimes paniculate, compound or decompound spikes. Stigmas 2 — VIGNEA, Beauv.

§ 1. Spikes approximate, with staminate and pistillate flowers variously situated. No. 11 - 13.

2. Spikes pistillate below, staminate at the summit. No. 14 - 28.

3. Spikes pistillate above, staminate at the base No. 29 - 41.

D. Staminate and pistillate flowers borne in separate (commonly more or less stalked) simple spikes on the same culm; the one or more staminate (sterile) spikes constantly uppermost, having occasionally more or less fertile flowers intermixed; the lower spikes all pistillate (fertile) or sometimes with staminate flowers at the base or apex. Stigmas 3 (or only 2 in No. 42 - 49 and 58). — CAREX PROPER.

* Perigynia with merely a minute or short point, not prolonged into a beak.

§ 1. Perigynia not inflated (slightly so in No. 51), smooth, nerved or nerveless, with a minute straight point; glaucous-green, becoming whitish, or more or less spotted or tinged with purple. Scales blackish-purple or brown. Staminate spikes 1 - 3, or the terminal spike androgynous and staminate at the base, the rest all fertile. No 42 - 57.

2. Perigynia slightly inflated, smooth, nerved, obtuse and pointless or with a straight or oblique point. Scales brown, becoming tawny or white. Staminate spike solitary (except sometimes in No. 62) or androgynous and pistillate above, the rest all fertile. No. 58 - 71.

3. Perigynia slightly inflated, hairy (in No. 70 smooth at maturity), nerved, with a minute straight point. Terminal spike androgynous, pistillate at the apex, the rest all fertile. No. 72, 73.

4. Perigynia not inflated, smooth, regularly striate, with a short, entire, obliquely bent or recurved point, remaining green at maturity. Staminate spike solitary. Bracts green and leaf-like (except in No. 74). No 74 - 81

5. Perigynia not inflated, smooth or downy, not striate, with a minute, obliquely bent, white and membranaceous point, reddish-brown or olive-colored at maturity. Terminal spike all staminate, or with 2 - 3 fertile flowers at the base; the rest all fertile, or with a few sterile flowers at the apex. Bracts reduced to colored sheaths, or with a short green prolongation. No. 82, 83.

* * Perigynia with a distinct beak, either short and abrupt, or more or less prolonged.

6. Perigynia not inflated, hairy, with a rather abrupt beak, terminating in a membranaceous notched or 2-toothed orifice Bracts short: culms mostly low and slender; leaves all radical, long and narrow Staminate spike solitary. No 84 - 90.

7. Perigynia slightly inflated, hairy or smooth, with a short beak terminating in an entire or slightly notched orifice Bracts long and leaf-like: culms tall and leafy. Staminate spike solitary (in No 91 pistillate at the summit): fertile spikes erect (except in No. 91). No. 91 - 98.

8. Perigynia slightly inflated, smooth and shining, green, few-nerved or nerveless, with a straight tapering beak terminating in 2 small membranaceous teeth. Staminate spike solitary: fertile spikes all on slender and pendulous stalks. No. 94 - 97.

9. Perigynia slightly inflated, smooth, nerved, with a tapering somewhat serrulate beak, terminating in 2 distinct membranaceous teeth; becoming tawny or yellow at maturity. Staminate spike solitary. No. 98 - 101.

10. Perigynia slightly inflated, rough or woolly, with an abrupt straight beak. Staminate spikes usually 2 or more. No. 102 - 105.

11. Perigynia moderately inflated, smooth (except No. 109), conspicuously many-nerved, with a straight beak terminating in 2 rigid more or less spreading teeth. Staminate spikes 1 - 5. No. 106 - 112.

12. Perigynia much inflated, smooth, conspicuously many-nerved, with a long tapering 2-toothed beak. Staminate spike solitary. No. 113 - 120.

13. Perigynia much inflated, obovoid or obconic, smooth, few-nerved, with an extremely abrupt, very long, 2-toothed beak, tawny or straw-colored at maturity, horizontally spreading or deflexed. Terminal spike staminate, or androgynous and fertile at the apex. No. 121, 122.

14. Perigynia much inflated, smooth, nerved (except No. 132), shining and straw-colored at maturity, with a tapering and more or less elongated 2-toothed beak. Staminate spikes 2 - 3. No. 123 - 132.

A. *Spike solitary, simple, diœcious or androgynous: bracts small, colored and scale-like.* — PSYLLÓPHORÆ, Loisel.

§ 1. *Spike diœcious, or the fertile merely with a few staminate flowers at the base.*

* *Stigmas* 2: *leaves all radical, bristle-form.*

1. **C. gynócrates,** Wormskiold. *Culm and leaves smooth,* or minutely rough at the top; barren spike linear; fertile spike ovoid, *loosely flowered; perigynia oblong, short-beaked, with a white membranaceous obtusely 2-toothed apex,* narrowed at the base, *nerved throughout, smooth,* spreading horizontally at maturity, longer than the acute or acutish scale. (C. dioica, *ed.* 1, not of *L.*) — Swamps, Wayne County, New York (*Sartwell*), to Michigan and northward. (Eu.)

2. **C. exìlis,** Dew. *Culm rough;* spike rarely all staminate and filiform, but commonly fertile with a few staminate flowers at the base, *densely flowered,* occasionally with 1 - 2 very small additional fertile spikes below the sterile flowers; *perigynia ovate-lanceolate, plano-convex, with a few fine nerves only on the convex side, serrulate on the margin; 2-toothed at the apex,* spreading, rather longer than the acute scales. — Swamps, E. New England to New Jersey, near the coast: also borders of mountain lakes, Essex County, New York.

* * *Stigmas* 3: *leaves flat.*

3. **C. scirpoídea,** Michx. Spike narrowly cylindrical; *perigynia ovoid,* with a minute point, *densely hairy, dark purple at maturity,* about the length of the pointed ciliate scale. (C. Wormskioldiana, *Hornem.* C. Michauxii, *Schw.*) — Alpine summits of the White Mountains, New Hampshire (*Oakes, &c.*), Willoughby Mt., Vermont (*Wood*), Drummond's Island, Michigan, and northward.

§ 2. *Spike androgynous, staminate at the summit.*

* *Stigmas* 2: *leaves bristle-form.*

4. **C. capitàta,** L. Spike small, roundish-ovoid; *perigynia broadly elliptical* with a notched membranaceous point, *compressed, smooth,* spreading, longer

than the rather obtuse scale. — Alpine summits of the White Mountains, New Hampshire, *Robbins*, *Oakes*. (Eu.)

* * *Stigmas* 3 : *leaves very narrow, shorter than the culm.*

5. **C. pauciflòra,** Lightfoot. Spike few-flowered; sterile flowers 1 or 2; *perigynia awl-shaped, reflexed, straw-colored; scales deciduous.* (C. leucoglochin, *Ehrh.*) — Peat-bogs, from New England and W. New York northward. (Eu.)

6. **C. polytrichoìdes,** Muhl. Culm slender; spike very small, few-flowered; *perigynia erect, alternate, oblong, compressed-triangular, obtuse,* slightly nerved, entire at the apex, *green,* twice the length of the ovate scale. (C. leptalea, *Wahl.* C. microstachya, *Michx.*) — Low grounds and bogs; common.

* * * *Stigmas* 3 : *leaves very broad* (1′–1½′), *longer than the naked culm.*

7. **C. Fraseriàna,** Sims. Pale or glaucous and glabrous; leaves without a midrib, many-nerved, smooth, with minutely crisped cartilaginous margins (9′–18′ long), convolute below around the base of the scape-like culm: spike oblong, the fertile part becoming globular; perigynia ovoid, inflated, mucronately tipped with a minute entire point, longer than the scarious oblong obtuse scale; often with a short appendage at the base of the achenium. — Rich woods, mountains of Penn.? Virginia, and southward; rare. — A most remarkable species, with no obvious affinity to any other.

B. *Spike solitary, simple,* androgynous, staminate at the summit; *bracts and scales of the pistillate flowers green, leaf-like,* tapering from a broad base, the lowest much longer than the spike, the uppermost equalling the slightly inflated perigynia: style jointed at the base: *stigmas* 3. (Leaves long and grassy, much exceeding the short, almost radical culms.) — PHYLLOSTÀCHYS, Torr. & Gr.

8. **C. Willdenòvii,** Schk. *Sterile flowers* 4–8, closely imbricated; *perigynia* 6–9, somewhat alternate, *oblong, rough on the angles and tapering beak;* achenium oblong, triangular, finely dotted; *stigmas downy.* — Copses, Mass., W. New York, and southwestward.

9. **C. Steudèlii,** Kunth. *Sterile flowers* 10–15, rather loosely imbricated into a linear (apparently distinct) spike; *perigynia* 2–3, *roundish-obovoid, smooth, with a long and abrupt rough beak;* achenium roundish, obscurely triangular, very minutely dotted; *stigmas downy.* (C. Jamèsii, *Schw.*) — Woody hill-sides, N. New York to Illinois and Kentucky.

10. **C. Bàckii,** Boott. *Sterile flowers* 3, *inconspicuous; perigynia* 2–4, *loose, globose-ovoid with a conical beak, smooth throughout;* achenium globose-pyriform, scarcely dotted; *stigmas smooth.* — Rocky hills, W. Massachusetts (Mount Tom, *Prof. Whitney*), and N. New York to Ohio, Lake Superior, and northward. — Culms generally shorter, and the leafy scales broader and more conspicuous, than in the last two.

C. *Spikes several or numerous, androgynous* (occasionally diœcious in No. 11 and 33), *sessile,* forming a compact or more or less interrupted sometimes paniculate-compound or decompound inflorescence: *stigmas* 2 : *achenium lenticular.* — VIGNÈA, Beauv.

§ 1. **Spikes approximated, with the *staminate and pistillate flowers variously situated;* perigynia plano-convex, nerved, with a rough slightly toothed beak:**

bracts light brown, resembling the scales, or with a prolonged point, shorter than the (at maturity) brown and chaffy-looking spikes. — SICCÀTÆ.

11. **C. bromoìdes**, Schk. *Spikes 4 – 6, alternate, oblong-lanceolate, some of the central ones wholly fertile;* perigynia erect, narrow-lanceolate with a tapering point, solid and spongy at the base, longer than the lanceolate scale; style jointed at the base. — Swamps, &c.; common. — A slender species, occasionally diœcious.

12. **C. siccàta**, Dew. *Spikes 4 – 8, ellipsoid, the uppermost, and commonly 1 – 3 of the lowest, fertile below, the intermediate ones frequently all staminate;* perigynia ovate-lanceolate, compressed, with a long rather abrupt beak, about the length of the scale; style minutely hairy. (C. pallida, *C. A. Meyer.* C. Liddoni, *ed.* 1, not of *Boott.*) — Sandy plains, New England to Illinois, and northwestward.

13. **C. Sartwéllii**, Dew. *Spikes numerous, short and ovoid, the upper chiefly staminate, the lower principally or entirely fertile;* perigynia ovate-lanceolate, the margins not united to the top, leaving a deep cleft on the outer side; scale ovate, pointed, about the length of the perigynium. — Seneca County, New York (*Sartwell*), to Illinois. — Too near C. intermedia of Eu.

§ 2. *Spikes pistillate below, staminate at the summit.*

* *Perigynia of a thick and corky texture,* with a short 2-toothed roughly-margined beak, nerved towards the base, *dark chestnut-brown and polished at maturity:* spikes decompound, paniculate: scales light brown, with white membranaceous margins; the bracts at the base resembling them, and with a short bristly prolongation. — PANICULÀTÆ.

14. **C. teretiúscula**, Good. Spikes with very short appressed branches, forming a slender crowded spiked panicle; *perigynia ovate, unequally biconvex, short-stalked,* with 3 – 5 *short nerves on the outer side near the broad somewhat heart-shaped base;* scale acute, rather shorter than the perigynium; *achenium obovoid-pyriform, obtusely triangular.* (C. paniculata, var. teretiuscula, *Wahl.*) — Swamps; common, especially northward. (Eu.)

Var. **màjor**, Koch. Spikes more panicled; perigynia rather narrower. (C. paniculata, var. minor, *ed.* 1. C. Ehrhartiana, *Hoppe.* C. prairiea, *Dew.*) Bogs and low grounds, New England to Wisconsin, and northward. (Eu.)

15. **C. decompósita**, Muhl. Panicle large, with very numerous densely-crowded spikes on the rather short spreading branches; *perigynia obovate, unequally biconvex, sessile, with a short very abrupt beak, conspicuously nerved on each side,* about the length of the ovate pointed scale. (C. paniculata, var. decomposita, *Dew.*) — Swamps, W. New York (*Sartwell*) to Penn., Illinois, and southwestward.

* * *Perigynia small,* compressed, 2 – 3-nerved, membranaceous, with a short 2-toothed rough beak, yellow or brown at maturity: *spikes decompound, with numerous small very densely-flowered heads:* scales of the fertile spikes tawny, with the green keel prolonged into a rough point: bracts short and resembling them at the base, or often becoming green and bristle-shaped, and much exceeding the culm. — MULTIFLÒRÆ.

16. **C. vulpinoídea,** Michx. Spike oblong and dense, or more or less interrupted, of 8 - 10 crowded clusters (1½′ - 2½′ long); perigynia ovate from a broad base, with a more or less abrupt beak, diverging at maturity. (C. multiflora, *Muhl.* C. bracteosa and C. polymorpha, *Schw.* C. microsperma, *Wahl.*) — Varies with the perigynium narrower, and the beak tapering and more strongly serrulate. (C. setacea, *Dew.*) — Low meadows; very common. — Varies exceedingly in the size and shape of the perigynium and beak.

* * * *Perigynia on short stalks*, plano-convex, *without a margin*, membranaceous, *with a thick and spongy base* and a long tapering 2-toothed rough beak, *distinctly nerved* (only obscurely so in No. 20 and 21), widely spreading and *yellow at maturity:* spikes dense, more or less aggregated, sometimes decompound: scales of the fertile spikes tawny, with a sharp point: bracts bristle-shaped, shorter than the thick and triangular culms. — VULPÌNÆ.

17. **C. crus-córvi,** Shuttleworth. Spike very large, decompound, the lower branches long and distinct, the upper shorter and aggregated; *bracts often 2-toothed at the base; perigynia attenuated from an ovate dilated and truncate base into a very long slightly-winged beak, much exceeding the scale; style tumid at the base.* (C. sicæformis, *Boott.* C. Halei, *Dew.*) — Swamps, Ohio to Wisconsin, and southward. — A conspicuous, very large species, with spikes 4′ - 9′ long, often somewhat paniculate, and *glaucous leaves* ½′ wide.

18. **C. stipàta,** Muhl. Spikes 10 - 15, aggregated, or the lower ones distinct and sometimes compound; *perigynia lanceolate, with a long beak tapering from a truncate base, much exceeding the scale; style not tumid at the base.* (C. vulpinoidea, *Torr.*, *Cyp.*, not of *Michx.*) — Swamps and low grounds; common.

19. **C. vulpìna,** L. Spikes numerous, aggregated into a cylindrical and dense (or at times elongated and somewhat interrupted) compound spike; *perigynia compressed, tapering from a broadly-ovate base into a beak not much longer than the scale; achenium oval; style tumid at the base.* — Ohio, Illinois, and Kentucky. — A tall, robust species, 3° - 4° high, with wide leaves and a remarkably thick rough culm. It is very like the last, from which it chiefly differs in the more compressed and wider base and shorter beaks of the perigynia. — The forms with interrupted spikes have also a general resemblance to No. 22; which, however, is distinguished by the *margined and nerveless* perigynia. (Eu.)

20. **C. alopecoídea,** Tuckerman. Head of 8 - 10 aggregated spikes, oblong, dense; *perigynia compressed, very obscurely nerved, ovate* from a broad truncate or somewhat heart-shaped base, a little longer than the scale; *achenium pyriform; base of the style not tumid.* (C. cephalophora, var. maxima, *Dew.*) — Woods, W. New York to Penn., Michigan, &c. — Much resembling the last, but smaller, with shorter and more compact spikes; easily distinguished by the *nearly nerveless perigynia*, and the different achenium and style.

21. **C. muricàta,** L. Spikes 4 - 6, ovoid, approximate but distinct, the lowermost sometimes a little remote; *perigynia ovate-lanceolate*, somewhat compressed, *nerveless, or very obscurely nerved towards the base*, rather longer than the scale; *achenium ovate*, base of the style not tumid. — Fields, Massachusetts (introduced ?), Ohio, and Kentucky; rare. — Spikes mostly looser than in the last, the perigynia narrower, with a longer and more tapering beak. (Eu.)

* * * * *Perigynia sessile*, plano-convex, *compressed, more or less margined*, membranaceous, with a rather short and rough (or wholly smooth in No. 26) 2-toothed beak, spreading and *green at maturity:* scales of the fertile spikes tawny or white: bracts bristle-shaped, commonly shorter than the culm.— MUHLENBERGIÀNÆ.

22. **C. sparganioides,** Muhl. *Spikes* 6 – 10, *ovoid; the upper ones aggregated, the lower distinct and more or less distant; perigynia broadly-ovate, nerveless, rough on the narrow margin*, about twice the length of the ovate-pointed scale; *achenium roundish-ovate; style short, tumid at the base.* — Var. CEPHALOÍDEA is a reduced state, with 4 – 6 rather smaller spikes, *closely aggregated* into an oblong head; resembling No. 23 in general appearance. (C. cephalophora, var. cephaloidea, & C. cephaloidea, *Dew.*) — Low rich grounds; not rare: the var. in fields and hedges. — A robust species, with rather wide pale-green leaves; sometimes with 1 – 2 short branches of a few spikes each at the base of the compound spike (probably C. divulsa, *Pursh*, not of *Goodenough*).

23. **C. cephalóphora,** Muhl. *Spikes* 5 – 6, *small, and densely aggregated in a short ovoid head; perigynia broadly ovate, with* 3 – 4 *indistinct nerves on the outer side*, scarcely longer than the ovate roughly-pointed scale; achenium and style as in the last. (C. Leavenworthii, *Dew.*) — Woods and fields; common.

24. **C. Muhlenbérgii,** Schk. *Spikes* 5 – 7, *closely approximate, forming an oblong head; perigynia orbicular-ovate, with a very short beak, prominently nerved on both sides*, about the length of the ovate roughly-pointed scale; *achenium orbicular, with a very short bulbous style.* — Fields; rather common, especially southward. — Plant 12′ – 18′ high, pale green, commonly with a bract at the base of each spike.

25. **C. ròsea,** Schk. *Spikes* 4 – 6, *the* 2 *uppermost approximate, the others all distinct, and the lowest often remote; perigynia oblong* (about 8 – 10 in each spike), narrow at the base, widely diverging at maturity, *twice as long as the broadly ovate obtuse scale.* — Varies with weak slender culms, and small 3 – 4-flowered spikes. (Var. RADIÀTA, *Dew.* C. neglecta, *Tuckerman.*) — Moist woods and meadows; common.

26. **C. retrofléxa,** Muhl. *Spikes* 4 – 5, *all approximate*, the 1 – 2 lowest distinct but not remote; *perigynia* (about 5 – 7 in each spike) *ovate, or ovate-lanceolate, smooth on the margin and beak, not much exceeding the ovate-lanceolate pointed scale*, widely spreading or reflexed at maturity. (C. rosea, var. retroflexa, *Torr., Cyp.*) — Copses and moist meadows; less common than the last, from which it is distinguished by the smaller approximate spikes, longer and sharper scales, and especially, from every species in this subsection, by the smooth margin and beak of the perigynium.

* * * * * *Perigynia* plano-convex, *without a beak, of a thick and leathery texture*, prominently nerved, smooth (except on the angles), *with a minute and entire or slightly notched white membranaceous point:* achenium conformed to the perigynium, crowned with the short thick style: bracts like the scales (brown), the lowest with a prolonged point: rootstock creeping. — CHORDORRHÌZÆ.

27. **C. chordorhìza,** Ehrh. *Culms branching from the long creeping rootstock* (4′ – 9′ high), smooth and naked above, clothed at the base with short ap-

pressed leaves; *spikes aggregated into an ovoid head;* perigynia ovate, a little longer than the scale. — Cold peat-bogs, New York to Wisconsin, and northward. (Eu.)

28. **C. tenélla,** Schk. *Spikes 2–4, very small, remote, with commonly 2 fertile flowers;* perigynia ovate, twice as long as the scale. (C. loliacea, *Schk. supp.*, not of *L.* C. disperma, *Dew.* C. gracilis, *ed.* 1, not of *Ehrh.*) — Cold swamps, New England to Penn., Wisconsin, and northward. — A slender species, 6′–12′ high, with long grassy leaves, growing in tufts. (Eu.)

§ 3. *Spikes pistillate above, staminate at the base.*

* *Spikes roundish-ovoid,* rather small, *more or less distant on the zigzag axis* (closely aggregated in No. 30): *perigynia* plano-convex, smooth, *pale green, becoming whitish or silvery:* scales white and membranaceous; the bracts resembling them, or prolonged and bristle-shaped. — CANESCÉNTES.

+– *Perigynia somewhat thickened and leathery, distinctly nerved, with a smooth or minutely serrulate short point, entire or slightly notched at the apex.*

29. **C. trispérma,** Dew. *Spikes 2–3, very small, with about 3 fertile flowers, remote, the lowest with a long bract;* perigynia oblong, with numerous slender nerves, longer than the scale. — Cold swamps and woods, especially on mountains, New England to Pennsylvania, Michigan, and northward. — Resembling the last, but with larger spikes and fruit, and weak spreading culms, 1°–2° long.

30. **C. tenuiflòra,** Wahl. *Spikes 3, few-flowered, closely approximated; perigynia ovate-oblong,* about the length of the broadly ovate scale. — Cold swamps, N. New England to Wisconsin, and northward. (Eu.)

31. **C. canéscens,** L. (in part). Pale or glaucous; *spikes 5–7 (about 12–20-flowered), the 2–3 upper approximated,* the rest all distinct and the lowermost remote; *perigynia ovate,* about the length of the pointed scale. (C. curta, *Good.* C. Richardi, *Michx.*) — Marshes and wet meadows; common, especially northward. (Eu.)

Var. **vitìlis** is a more slender and weak form, not glaucous, with smaller and roundish 6–15-flowered spikes, the more pointed perigynia spreading (and often tawny) at maturity: perhaps a good species. (Var. alpicola and var. sphærostachya, *ed.* 1. C. tenella, *Ehrh.* C. Persoonii, *Sieber.* C. vitilis, *Fries.* C. Gebhardi, *Hoppe.* C. sphærostachya and C. Buckleyi, *Dew.*) — On mountains, and high northward. (Eu.)

+– +– *Perigynia thickened only at the base, obscurely nerved on the outer side, tapering into a rough 2-toothed beak.*

32. **C. Deweyàna,** Schw. Spikes about 4; the 2 uppermost approximate, the others distinct, the lowest long-bracted; *perigynia oblong-lanceolate,* rather longer than the sharply pointed or awned scale. — Copses, New England to Wisconsin, and northward.

* * *Spikes ovoid or obovoid, more or less clustered; perigynia concave-convex, compressed, margined or winged,* nerved, with a rough 2-toothed beak, often tawny at maturity: scales tawny or white, awnless: bracts bristle-shaped, usually falling before the maturity of the spikes (in No. 34 persistent, very long and leaf-like.)

+ *Spikes small; perigynia thick and spongy at the base, and with a rigid margin, not dilated.* — STELLULÀTÆ.

33. **C. stellulàta,** Good. *Spikes* 3–5, *distinct*, obovoid or roundish at maturity; perigynia ovate from a broad somewhat heart-shaped base, widely spreading at maturity, longer than the ovate acute scale; achenium ovate, abruptly contracted into a minute stalk; style slightly tumid at the base. — Var. SCIRPOÌDES has *smaller more approximate spikes*, the perigynia ovate from a rounded or truncate base, narrower and less acute scales, and a very short style. (C. scirpoides, *Schk.*) — Var. STÉRILIS has the *spikes occasionally diœcious*, or the staminate ones with but few fertile flowers, and the pistillate nearly destitute of barren ones; the culms stouter and rigidly erect; and the leaves generally glaucous; achenium rounder, with a more tapering base, and the style scarcely tumid at the base. (C. sterilis, *Schk.*) — Var. ANGUSTÀTA has about 4 aggregated spikes, with *narrowly lanceolate perigynia* tapering into a long slightly rough beak, more than twice the length of the blunt scale; the achenium oblong. — Swamps and wet meadows; common, especially northward. (Eu.)

+ + *Spikes rather large: perigynia thickened and spongy on the angles, with a more or less dilated membranaceous margin or wing.* — OVÀLES.

34. **C. sychnocéphala,** Carey. *Spikes densely clustered, forming a short compound spiked head subtended by* 3 *very long unequal leafy bracts; perigynia tapering* from an abruptly contracted ovate base *into a long slender beak*, somewhat exceeding the lanceolate abruptly mucronate scale. (C. cyperoides, *Dew.*, not of *L.*) — Jefferson County (*Vasey & Knieskern*) and Little Falls, New York, *Vasey*. — Different in habit from all the rest of this section, and recognized at once by the ovoid compound spike, seated at the base of the long leafy bracts, by which the lower spikes are partly concealed.

35. **C. árida,** Schw. & Torr. *Spikes* 8–10, approximate (¾′ *long*), *oblong-cylindrical, contracted at each end;* perigynia narrowly lanceolate (4–5 *lines in length*), tapering into a long *beak more than twice the length of the ovate-lanceolate scale;* achenium sessile, narrowly oblong. (C. Muskingumensis, *Schw.*) — Wet meadows, Ohio and Michigan to Illinois and Kentucky. — In its characters scarcely distinguished from the next, but strikingly different in appearance; a much larger plant, with long, dry, and chaffy-looking spikes.

36. **C. scopària,** Schk. *Spikes* 5–8, *club-shaped,* at length ovate, more or less approximate, *sometimes forming a dense head: perigynia narrowly lanceolate, tapering into a long slender beak, longer than the lanceolate pointed scale;* achenium distinctly stalked, exactly oval. — Low meadows; everywhere common. — Spikes brownish or straw-colored when ripe.

37. **C. lagopodioìdes,** Schk. *Spikes* 10–15, approximate; *perigynia ovate-lanceolate, nearly twice the length of the ovate-oblong rather obtuse scale;* achenium narrowly oval, on a short stalk. — Var. CRISTÀTA has the spikes closely aggregated, with the perigynia spreading. (C. cristata, *Schw. & Torr.*) — Wet fields; equally common with the last, from which it is distinguished only by the more numerous shorter spikes, and shorter less tapering perigynia and scales. The variety has the spikes crowded into an ovate head, to which the diverging points of the fruit give a squarrose appearance.

38. **C. adústa,** Boott. *Spikes* 4 – 10, approximate or rather distant, ovate or at length club-shaped (straw-color or pale chestnut); *perigynia ovate with a tapering beak, slightly winged, rather obscurely nerved,* especially on the upper side, *equalling the scale* in length and breadth. — Rhode Island (*Olney*), New York (*S. T. Carey, &c.*), Lake Superior (*C. G. Loring, Jr.*, with the smaller form), and northward. — Much like some forms of the next, but the spikes more chaffy, the perigynia tapering into a longer beak.

39. **C. festucàcea,** Schk. *Spikes* 6 – 8, *obovoid or club-shaped,* the lower distinct; *perigynia ovate, narrowly winged, with a short beak, longer than the ovate lanceolate scale;* achenium sessile, broadly oval. — Var. TÉNERA has (3 – 5) smaller spikes, which are more distant on the slender, flexuose, sometimes nodding stem. (C. tenera, *Dew.*) — Var. MIRÁBILIS has (6 – 8) rounder approximate spikes, with fewer staminate flowers, and the perigynia somewhat spreading. (C. mirabilis, *Dew.*) — About fields and fences; rather common, especially northward. — A stiff and rigid species, often of a pale-green appearance, except the first variety, which has commonly brownish heads, and a weak stem.

40. **C. fœ̀nea,** Muhl. *Spikes* 4 – 10, *ovoid, approximate,* the lower rarely compound, *of a glaucous-green color; perigynia ovate, winged, with a short beak,* scarcely longer than the oblong and *bluntish white scale;* achenium on a short stalk, oval. — Salt or brackish marshes, on the sea-coast, Rhode Island (*Olney*) to Virginia, and southward. — Much like the last, from which it differs principally in the color of the spikes, and in the constantly erect and more broadly-margined perigynia. The culm is smooth and stout.

41 **C. stramínea,** Schk. *Spikes* (*about* 6), *roundish-ovoid, approximate; perigynia orbicular-ovate,* much compressed, *broadly and membranaceously winged,* with a short abrupt beak a little longer than the lanceolate scale; achenium nearly sessile, oval. — Borders of woods and in fields; rather common. — The larger forms have a remarkably wide wing, often brown on the margin, giving a variegated appearance to the soft and flaccid spikes. In the smaller forms the heads are fewer (3 – 4) and more rigid, owing to the narrower wings of the perigynia.

D. *Staminate and pistillate flowers borne in separate* (*commonly more or less stalked*) *simple spikes on the same culm;* the one or more staminate (sterile) spikes constantly uppermost, having occasionally more or less fertile flowers intermixed; the lower spikes all pistillate (fertile), or sometimes with staminate flowers at the base or apex: *stigmas 3: achenium sharply triangular* (only 2 stigmas and the achenium lenticular in No. 42 – 51 and 58). — CAREX Proper.

§ 1. *Perigynia without a beak, smooth, not inflated* (slightly in No. 51), *terminating in a minute, straight, entire or notched point,* glaucous-green when young, becoming whitish, often spotted or tinged with purple, or occasionally nearly black at maturity: *pistillate scales blackish-purple* (brown in No. 51 and 57), *giving a dark appearance to the spikes.*

* *Sterile spikes* 1 – 3, *stalked,* often with more or less fertile flowers: *pistillate spikes* 3 – 5, *frequently with sterile flowers at the apex:* bract of the lowest spike leaf-like, with dark-colored expansions (auricles) at the base, and very minute sheaths, or none. (*Culm and leaves more or less glaucous.*)

+- *Stigmas* 2 (*in No.* 42 *sometimes* 3): *perigynium lenticular.* — ACUTÆ.

++ *Scales awnless, mostly obtuse.*

42. **C. rigida,** Good. *Sterile spike solitary; the fertile* 2 - 4, *cylindrical, erect, rather loosely flowered,* the lower on short peduncles; lowest bract about the length of the culm, with rounded auricles; *stigmas* 2 - 3, *mostly* 2; perigynia elliptical, with an entire *scarcely pointed apex, nerveless,* or very obscurely nerved, about as long as the obtuse scale; culm rigid, nearly smooth except towards the top, about the length of the firm erect leaves. (C. saxátilis, *Fl. Dan.*, not of *L.*) — Var. BIGELÒVII has 3 - 5 longer fertile spikes, the lowest on a long stalk, spreading and sometimes remote. (C. Bigelovii, *Torr.* C. Washingtonia, *Dew.* C. nigra, *Schw. & Torr.*, not of *All.*) — Alpine summits of the mountains of N. New England and New York, and high northward. (Eu.)

43. **C. tórta,** Boott, Mss. Sterile spikes 1 - 2, commonly 1; *fertile* 3 - 4, *elongated, narrowly-cylindrical or slightly club-shaped, loosely few-flowered at the base,* occasionally more or less staminate at the apex, the lower on smooth slender stalks, at first erect, *finally spreading or drooping; bracts with oblong auricles,* or very slightly sheathing, the lowest about the length of the culm, the rest bristle-shaped, shorter than their respective spikes; *perigynia* elliptical, short-stalked, *tapering to a distinct point,* with a minutely notched or jagged membranaceous orifice, very smooth, *nerveless,* or with 2 - 3 indistinct short nerves, *the tips spreading or obliquely recurved at maturity,* scarcely exceeding the narrow obtuse scale; achenium broadly obovate, much shorter than the perigynium; *culm very smooth,* leaves slightly rough on the margin only. (C. verrucosa, *Schwein.* C. acuta, var. sparsiflora, *Dew.* ?) — Rills and wet banks, N. New England, New York, &c., and along the mountains from Penn. southward. — Culm rather slender, 15′ - 2° high, usually with 3 slender and nodding fertile spikes. It is well distinguished by its smoothness, and by the spreading empty tips of the perigynia.

44. **C. vulgàris,** Fries. Sterile spike 1, rarely 2; the *fertile* 2 - 4, *approximated, oblong, erect, densely-flowered,* occasionally staminate at the apex, the lowest on a very short stalk; lowest bract about the length of the culm, with *small blackish rounded auricles; perigynia ovate-elliptical, stalked, nerved* especially towards the base, with a very short abrupt entire or minutely notched point, *longer than the obtuse appressed black scale;* culm slender, nearly smooth, except at the top. (C. cæspitosa, *Good & Amer. auth.*, not of *L.* C. Goodenovii, *Gay.*) — Banks of streams, New England to Wisconsin and northward. — Grows in small patches (not in dense tufts like No. 46), and varies in height from 3′ to 18′, with narrow leaves shorter than the culm. From the last it differs in the short thick spikes, and erect perigynia, and in the auricles of the bracts; and from the next, in the shape and nerves of the perigynium, and in the shorter, black, appressed scale. (Eu.)

45. **C. apérta,** Boott. Sterile spikes 1 - 2, oblong-cylindrical, acute; *fertile* 2 - 4, *oblong, erect, the uppermost approximate and sessile;* the lower distant and short-stalked, staminate at the apex, or often entirely fertile; lowest bract about the length of the culm, with oblong brown auricles, or very slightly sheathing, the upper bristle-shaped, shorter than the spikes; *perigynia roundish-ovate, stalked, without nerves,* covered with very minute transparent dots, and sometimes very

slightly rough at the apex, *with an abrupt very short notched orifice*, broader and *much shorter than the lanceolate pointed brown scale*; culm sharply triangular, smooth below, exceeding the rough sharp-pointed leaves. (C. acuta, var. erecta, *Dew.?*) — Wet meadows, Rhode Island (*Olney*), and far westward. — Culm 1° – 2° high, with commonly 2 fertile spikes ¾′ – 1½′ in length, appearing somewhat bristly from the long and spreading scale. Differs from the next chiefly in the rounder perigynium and nearly smooth culm, and should perhaps be referred to it.

46. **C. stricta,** Lam. (not of *Good.*) Sterile spikes 1 – 3; the *fertile* 2 – 4, *cylindrical, slender, usually barren at the summit*, sessile, or the lower on a short stalk; lower bract with rounded or oblong brown auricles, seldom exceeding the culm; *perigynia ovate-acuminate or elliptical, nerveless* or very obscurely few-nerved, *often minutely rough on the short, entire, or slightly notched point*, usually shorter and broader than the narrow reddish-brown scale; *culm slender, sharply triangular, rough*, longer than the narrow and rigid rough and glaucous leaves. (C. acuta, *Muhl. & Amer. auth.*, not of *L.* C. Virginiana, *Smith in Rees, Cycl.* C. angustata, *Boott.*) — Var. STRÍCTIOR has shorter and more densely flowered fertile spikes, and perigynia equalling or somewhat exceeding the scale. (C. strictior, *Dew.*) — Wet meadows and swamps; very common. Grows in large and thick tufts, 2° – 2½° high. The scales of the fertile spikes are very variable; the lower commonly acute, the upper narrower and obtuse. This species and the last have been referred to C. acuta, *L.*, which has not been found in North America.

47. **C. aquátilis,** Wahl. Sterile spikes commonly 2 – 3; *the fertile* 3 – 5, *club-shaped, erect, densely flowered, sessile*, or the lower on very short stalks; *bracts long*, 1 – 2 *of the lowest exceeding the culm; perigynia obovate-elliptical, stalked, nerveless*, with a very short entire point about the length of the lanceolate scale; culm sharply triangular, rough towards the top, not much exceeding the pale-green glaucous leaves. — Margins of lakes and rivers, New England to Wisconsin, and northward. — A rather robust species 2° – 3° high; the thick fertile spikes 1′ – 2′ long. (Eu.)

48. **C. lenticulàris,** Michx. *Sterile spike single and mostly fertile at the top;* the fertile 2 – 5, erect, cylindrical (½′ – 1′ long), sessile, or the lower short-peduncled, densely-flowered; bracts exceeding the culm; *perigynia ovate-oval, sessile, more or less nerved*, abruptly short-pointed, the point entire, slightly exceeding the oblong and very obtuse scale; culm (9′ – 15′ high) and leaves smooth or nearly so. — Lake Avalanche, N. New York (*Torrey*), Lake Superior, and northward.

↔ ↔ *Scales awned.*

49. **C. salìna,** Wahl. Sterile spikes 2 – 3; the *fertile* 2 – 4, *cylindrical, erect*, often sterile at the apex, on more or less included stalks; bracts long, with rounded auricles, the two lowest commonly exceeding the culm; *perigynia ovate-elliptical*, with a minute entire point, nerveless, *rather shorter than the roughly-awned dark-brown scale;* culm rough at the top, rather exceeding the leaves. — Coast of Massachusetts (near Chelsea? *Greene*), and far northward. (Eu.)

50. **C. marítima,** Vahl. Sterile and fertile *spikes* each about 2 or 3 (1′ long), *spreading or drooping on slender peduncles; perigynia nearly orbicular,*

with a short entire point, *much shorter than the long-awned greenish scale; culm* (1° high) *and the broad flat leaves smooth.* (C. paleacea, *Wahl.*) — Coast of Massachusetts and northward; rare. (Eu.)

51. **C. crinita,** Lam. Sterile spikes 1 – 2, *often with fertile flowers variously intermixed; the fertile* 3 – 5, *long-cylindrical* (2′ – 3′ long), *densely flowered, on exserted nodding stalks;* bracts very long, exceeding the culm; *perigynia roundish-obovate, slightly inflated,* obscurely nerved, with a short entire point, shorter than the *oblong roughly-awned light-brown scale; culm* (2° – 4° high) *rough and sharply angled,* leafy below; the pale leaves 3″ – 4″ wide, also rough-edged. — Varies, with the awns of the scales *very long* and the fruit imperfect (var. MÓRBIDA, *Carey in Sill. Jour.* & C. paleacea, *Amer. auth.,* not of *Wahl.*); and with awns not much longer than the scales (C. gynandra, *Schw.*). — Wet meadows and borders of rills; very common. — A variable but easily recognized species.

+ + *Stigmas* 3: perigynium obtusely triangular, indistinctly few-nerved, more or less compressed: *pistillate spikes borne on exserted filiform drooping stalks.* — LIMÒSÆ.

52. **C. flácca,** Schreb. Sterile spikes 1 – 2; *the fertile about* 3, *cylindrical, on exserted drooping stalks, commonly staminate at the top;* lower bract usually shorter than the culm; sheaths obsolete or minute; *perigynia roundish-ovoid,* notched at the point, *smooth or slightly roughened on the angles,* about the length of the obtuse or pointed *black scale;* culm sharply triangular, rough, taller than the glaucous rigid leaves. (C. glauca, *Scop.* C. recurva, *Huds.* C. Barrattii, *Schw. & Torr.*) — Marshes of New Jersey, near the coast, *Collins, Knieskern.* — A widely variable species. (Eu.)

53. **C. limòsa,** L. Staminate spike solitary; *the fertile* 1 – 2, *oblong,* 10 – 20*-flowered,* occasionally with staminate flowers at the apex; *bracts very narrow, the lowest shorter than the culm; perigynia ovate,* with a minute entire point, *about equal to the ovate mucronate scale.* — Peat-bogs, New England to Pennsylvania, Wisconsin, and northward. — Culm 6′ – 12′ high, erect, longer than the sharp and rigid leaves. (Eu.)

54. **C. irrigua,** Smith. Staminate spike solitary; *the fertile* 2 – 4, *ovoid or oblong,* occasionally staminate at the apex, or rarely with a few sterile flowers at the base; *lowest bract as wide as the leaves, longer than the culm; perigynia roundish-ovate,* with an entire orifice, *much shorter than the tapering pointed scale.* (C. limosa, var. irrigua, *Wahl.* C. paupercula, *Michx.*) — Peat-bogs, New England to Penn., Wisconsin, and northward. — Taller than the last, growing in clumps, with weaker nodding stems, often exceeded by the leaves. (Eu.)

* * *Uppermost spike club-shaped, pistillate above and staminate at the base; the rest all fertile,* or with a few sterile flowers below: lowest bract leaf-like, scarcely equalling the culm, with minute light-brown auricles and no sheaths: culm and leaves of a pale glaucous-green. — ATRÀTÆ.*

55. **C. Buxbaúmii,** Wahl. *Spikes* 3 – 4, *obovoid or oblong, the uppermost short-stalked* (rarely altogether staminate), *the others nearly sessile,* the lowest some-

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* C. VAHLII, Schk., of this group, occurs on the north shore of Lake Superior and on Isle Royale, but has not yet been met with on the United States side.

what remote; perigynia elliptical, obtusely triangular, compressed, obscurely nerved, with a distinctly notched orifice, scarcely equalling the ovate sharp-pointed or short-awned (dark-brown or brownish) scale. (C. canescens, *L.*, in part.) — Peat-bogs, New England to Wisconsin, and northward; also southward along the Alleghanies. (Eu.)

56. **C. atràta,** L. *Spikes* 3 – 4, *oblong-ovoid, approximate, all on short filiform stalks, at length drooping;* perigynia ovoid, with a short notched point, about the length of the ovate acute (brown or dark purple) scale. — Alpine summits of the White Mountains, New Hampshire. — About 12′ – 15′ high, with rather rigid leaves, nearly equalling the culm. Fruit at first straw-color, mostly becoming dark purple or nearly black. (Eu.)

57. **C. Shortiàna,** Dew. *Spikes about* 5, *cylindrical, erect,* more or less distant, greenish turning straw-color, (½′ – 1½′ long,) and the lowest rather remote, *all androgynous and densely flowered;* the terminal one about half staminate, the rest with only a few barren flowers at the base, the 2 – 3 lower on short stalks; *perigynia broadly obovate, abruptly contracted at the base into a short stalk, with an extremely minute entire point,* little longer than the short-pointed somewhat obovate scale. — Marshes, S. Pennsylvania to Illinois, and southward. — Plant 1° – 3° high.

§ 2. *Perigynia without a beak, smooth, slightly inflated,* bluntly triangular, nerved, *with an obtuse and pointless orifice, or a short* (and straight or oblique) *entire or notched point:* bracts leaf-like, sheathing: *staminate spike solitary* (except sometimes in No. 62), *or androgynous and pistillate above; the rest all fertile.*

* *Staminate spike on an elevated stalk* (short-stalked or sessile in No. 63, 64, in No. 61 occasionally with 1 – 2 small ones at its base): pistillate spikes 1 – 6, erect, the upper on very short, the lower on more or less elongated exserted stalks (short and included in No. 64): *bracts shorter than the culm* (except in No. 58 and 63): *perigynia with an entire and straight or obliquely bent point, glaucous-green when young, becoming cream-colored or yellow at maturity,* sometimes spotted with purple (stigmas only 2 in No. 58): pistillate scales dark-brown with white margins, fading to tawny. (Leaves mostly radical, more or less glaucous.) — PANÍCEÆ.

58. **C. aùrea,** Nutt. *Fertile spikes* 3 – 4, *oblong, loosely flowered,* the lowest often very remote; *perigynia obovate or pear-shaped,* obtuse, longer than the ovate acute scale; *stigmas* 2; *achenium lenticular.* (C. pyriformis, *Schw.*) — Wet grassy banks, especially on limestone; New England to Wisconsin, and northward. — A slender, delicate species, 4′ – 8′ high, with long grassy leaves, and bracts exceeding the culm. Sterile spike often with some fertile flowers at the apex.

59. **C. lìvida,** Willd. *Fertile spikes* 1 – 2, rarely with a third near the base of the culm, 10 – 15-*flowered; perigynia ovoid-oblong, with faint pellucid nerves,* tipped with a straight obtuse point, rather longer than the ovate scale. (C. limosa, var. livida, *Wahl.* C. Grayana, *Dew.*) — Peat-bogs and wet pine barrens, New Jersey, Oriskany, New York, and high northward. — Occurs rarely with a single (sterile) spike, or with an additional fertile one on an erect stalk 6′ – 9′ long, arising from the base of the culm. Plant very glaucous, the leaves rigid and finely tapering. (Eu.)

60. **C. panicea,** L. *Fertile spikes* 1 – 3, *commonly* 2, *ovoid, oblong, or cylindrical, closely flowered,* remote; *perigynia when young oblong, and contracted at each end, at maturity roundish-obovoid, scarcely inflated,* with more obscure nerves, and a slightly-bent point, longer than the ovate pointed or awned scale; *achenium triquetrous, flattened at the top,* contracted towards the base, *distinctly dotted* under a lens. (C. Meadii, *Dew.*) — Wet meadows and margins of streams, New England to Wisconsin, and southwestward. — Very variable in the length and thickness of the fertile spikes, the slender forms approaching closely to the next; in both, the shape of the fruit varies greatly with age. (Eu.)

61. **C. tetánica,** Schk. *Fertile spikes* 1 – 3, *commonly* 2, *oblong-cylindrical, loosely flowered,* remote; *perigynia when young pointed at each end, at maturity obovoid, scarcely inflated,* with a slightly bent point, longer than the ovate pointed or awned scale; *achenium ovoid-triquetrous, indistinctly dotted* under a lens. (C. conoidea, *Gray, Gram. & Cyp.*, not of *Schk.* C. Woodii, *Dew.*) — Margins of lakes and rivers, N. New York to Michigan, and southward.

62. **C. Cráwei,** Dew. Sterile spike usually solitary, or with 1 (rarely 2) short additional ones at its base, the principal sometimes fertile at the apex; *fertile spikes* 3 – 6, *remote, and the lowest near the root, oblong or cylindrical, densely flowered,* and sometimes slightly compound at the base; *perigynia ovoid-oblong, obscurely nerved,* with a short slightly bent point, longer than the rather obtuse scale. (C. heterostachya, *Torr.*) — Clefts of rocks, Jefferson County, New York (*Crawe*), shore of Lake Ontario (*Vasey*), and N. Michigan (*Bull*). — A very variable species, rigidly erect, 4′ – 12′ high, in some of its forms much resembling the next; but the perigynium is less round and with fewer and more indistinct nerves, the bracts do not exceed the culm, and the staminate spike is long-peduncled.

63. **C. granuláris,** Muhl. *Sterile spike sessile,* or short-stalked, occasionally bearing a few fertile flowers; *pistillate spikes* 3 – 4, *cylindrical, densely flowered,* the lowest sometimes very remote, or near the root; *perigynia roundish-ovoid, prominently nerved,* with a minute slightly bent point, longer than the acute scale; *bracts long, exceeding the culm.* — Wet meadows; very common.

64. **C. Tórreyi,** Tuckerman. *Sterile spike short-stalked; fertile spikes* 2 – 3, *ovoid,* closely approximate, all on included stalks; *perigynia roundish-obovoid, obtuse, with conspicuous elevated nerves,* and a distinct abrupt point, longer than the ovate pointed scale; *culm, leaves, and short bracts downy.* (C. abbreviata, *Schw. mss. & Boott.*) — Bethlehem, Pennsylvania, *Schweinitz;* and high northward. — Probably often overlooked from its close external resemblance to the next, but it is very distinct.

* * *Staminate spike sessile, or short-stalked* (except in No. 66): pistillate spikes 2 – 5, erect, all on more or less exserted stalks: *bracts longer than the culm* (except in No. 66): *perigynia very obtuse,* with an abrupt and minute (or almost obsolete) point, *green and somewhat pellucid at maturity:* pistillate scales tawny, fading to white. — PALLESCÉNTES.

65. **C. palléscens,** L. *Fertile spikes* 2 – 3, *ovoid, densely flowered, approximate; perigynia obovoid-oblong, obscurely nerved,* about the length of the scale. — **Var.** UNDULÀTA has the lower bract indented at the base with transverse waved

lines. (C. undulata, *Kunze.*) — Meadows, New England to Penn. and northward. — Plant 8′ - 18′ high, with slightly pubescent culm and leaves. (Eu.)

66. **C. conoìdea,** Schk. *Staminate spike on a long stalk; fertile* 2 - 3, *oblong, closely flowered*, the lower distant; *perigynia oblong-conical, with impressed nerves*, slightly oblique at the summit, rather longer (or sometimes shorter) than the sharply pointed or awned scale; *bracts not exceeding the culm.* (C. tetanica, *Schw. & Torr.*, not of *Schk.*) — Moist meadows; rather common.

67. **C. grisea,** Wahl. *Fertile spikes* 3 - 5, *oblong, loosely flowered*, remote, and the lowest distant; *perigynia ovoid-oblong*, rather longer than the ovate awned scale. (C. laxiflora, *Schk.*, not of *Lam.*) — Var. MÙTICA has longer cylindrical spikes, short-awned scales, and the leaves and bracts pale green and glaucous. (C. laxiflora ? var. mutica, *Torr. & Gr.* C. flaccosperma, *Dew.*) — Moist woods and meadows; common, especially southward. The variety, with spikes 1′ - 1½′ long, occurs in New Jersey (*Knieskern*) and in the South.

* * * *Uppermost spike more or less pistillate at the apex* (rarely all staminate); *pistillate spikes* 3 - 5, oblong or cylindrical, loosely flowered, distant, *on exserted filiform and mostly drooping stalks:* bracts equalling or often exceeding the culm: perigynia oblong, with a short and abrupt notched point (obsolete in No. 70), green and membranaceous at maturity: pistillate scales tawny or white. — GRACÍLLIMÆ.

+ *Fertile spikes nodding or pendulous.*

68. **C. Davísii,** Schw. & Torr. *Fertile spikes oblong-cylindrical, rather thick; perigynia* somewhat contracted at each end, *scarcely longer than the conspicuously awned scale.* (C. aristata, *Dew.*, not of *R. Br.* C. Torreyana, *Dew.*) — Wet meadows, Massachusetts to Wisconsin, and southward. — Larger than the next (1½° - 2° high), and with stouter and longer spikes.

69. **C. formòsa,** Dew. *Fertile spikes oblong, short*, all commonly with 2 - 3 barren flowers or empty scales at the base; *perigynia* somewhat contracted at each end, *nearly twice as long as the pointed or cuspidate scale.* — Wet meadows; Massachusetts to W. New York.

70. **C. gracillima,** Schw. *Fertile spikes linear, slender; perigynia obtuse and slightly oblique at the orifice*, longer than the oblong awned scale. (C. digitalis, *Schw. & Torr.*, not of *Willd.*) — Wet meadows, New England to Kentucky, Wisconsin, and northward. — When this species occurs with the uppermost spike altogether staminate, it resembles C. arctata; but is readily distinguished by the obtuse, beakless, and sessile perigynium.

+ + *Fertile spikes nearly erect, all but the lowest short-petioled or nearly sessile.*

71. **C. æstivàlis,** M. A. Curtis. Spikes slender, loosely flowered; perigynia acutish at both ends, twice the length of the *ovate obtuse or mucronate scale; achenium* somewhat stipitate; sheaths of the lower leaves pubescent: otherwise nearly as the last, but a smaller plant (1° - 1½° high). — Saddle Mountain, W. Massachusetts (*Dewey*), Pokono Mountain, Penn. (*Darlington & Townsend*), and along the Alleghanies to Virginia and southward.

§ 3. *Perigynia without a beak, hairy* (in No. 73 becoming smooth at maturity), *slightly inflated*, bluntly 3-angled, obtuse, conspicuously nerved, with a minute abrupt straight point: bracts narrow, with very short or obsolete sheaths, the lowest exceeding the culm: pistillate scales tawny or white: *spikes 2 – 4, erect, the uppermost androgynous, pistillate at the apex and club-shaped; the rest all fertile.* — VIRESCÉNTES.

72. **C. viréscens,** Muhl. *Spikes oblong or cylindrical, on short stalks; perigynia ovoid,* nearly entire at the orifice, rather longer than the ovate awned scale; *leaves and sheaths hairy.* (C. costata, *Schw.*) — Rocky woods and hill-sides, New England to Michigan, and southward. — Culms rough and slender, 1° – 2° high; fertile spikes ½′ – 1′ long.

73. **C. triceps,** Michx. *Spikes ovoid, nearly sessile, closely approximate; perigynia broadly obovoid,* entire at the orifice, downy when young, *smooth at maturity,* rather longer than the pointed scale; *sheaths very hairy,* leaves more or less so. (C. hirsuta, *Willd.* C. viridula, *Schw. & Torr.,* not of *Michx.*) — Varies with the spikes rather longer and on stalks, and the leaves nearly smooth. (C. hirsuta, var. pedunculata, *Schw. & Torr.*) — Woods and meadows; rather common; the smoother form southward. — Culm 12′ – 18′ high. Spikes ½′ – ¾′ long.

§ 4. *Perigynia without a beak, smooth, not inflated, 3-angled, regularly striate, terminating in a short entire rather obliquely bent or recurved point, remaining green at maturity:* pistillate scales membranaceous, mostly tipped with a rough point or awn, brown or spotted, fading to white: *staminate spike solitary: pistillate spikes 2 – 5, few-flowered,* more or less remote, the lowest often near the base of the culm.

* Sterile spike club-shaped: *fertile spikes* (erect, the uppermost commonly near the base of the sterile) *all on stalks principally included within sheathing bracts* (except sometimes the lowest), *shorter than the spikes, or not much exceeding them: perigynia ovoid-triquetrous,* narrowed at each end: culms numerous, diffuse and in fruit becoming prostrate: *leaves all radical, very broad,* finely and closely nerved throughout, with 3 distinct ribs. — PLANTAGÍNEÆ.

74. **C. plantaginea,** Lam. *Fertile spikes commonly* 4, *oblong,* about 5 – 8-flowered; *bracts very short, dark purple,* or the lowest greenish at the apex. (C. latifolia, *Schk.*) — Shady woods, mostly on hill-sides in rich soil, New England to Wisconsin, and northward; and southward in the Alleghanies.

75. **C. Careyàna,** Torr. *Fertile spikes 2 – 3, ovoid or oblong,* about 3 – 5-flowered, *bracts green,* the upper about equal to the spikes, the lower somewhat exceeding them; *perigynia large* (2″ – 2½″ in length); *leaves dark green.* — In similar situations with the last, N. New York to Penn. and Ohio: rare.

76. **C. platyphýlla,** Carey. *Fertile spikes 3, filiform, loosely 3 – 4-flowered;* bracts as in the last; *perigynia small;* culms slender; *leaves pale or whitish-green.* — In similar situations with No. 74, and with the same range.

* * Sterile spike short, club-shaped, pedunculate: *fertile spikes 2 – 4, all on filiform exserted stalks, with long sheathing bracts resembling the leaves,* the uppermost, as well as the leaves, exceeding the slender and at length prostrate culms: perigynia as in the last subsection. — DIGITÀLES.

77. **C. retrocúrva,** Dew. *Fertile spikes ovoid or oblong, compactly 3 – 8-flowered, on long drooping stalks: leaves glaucous, 3 – 4 lines wide,* with 3 prominent

nerves. — Copses and hill-sides, New England to W. New York and Pennsylvania. — Very closely approaching the next; perhaps only a variety of it.

78. **C. digitàlis,** Willd. *Fertile spikes linear-oblong, loosely 6–9-flowered,* on long stalks, the lowest sometimes drooping; *leaves and bracts narrow, dark green;* perigynia smaller than in the last. (C. oligocarpa, *Schw. & Torr.*, not of *Schk.* C. Vanvleckii, *Schw.*) — Copses and hill-sides, New England to Michigan, and southward. — A low species, 6′–12′ high, growing in tufts, with numerous culms and long grassy leaves.

* * * Sterile spike short, linear; *fertile spikes* 2–4, *erect;* the 1–2 uppermost commonly near the base of the sterile, on an included stalk; the rest on exserted stalks, with *long sheathing bracts resembling the leaves;* the uppermost exceeding the erect culm: *perigynia with obtuse angles,* about the length of the scale. — OLIGOCÁRPÆ.

79. **C. laxiflòra,** Lam. *Fertile spikes slender, loosely flowered on a zigzag rhachis; perigynia ovoid,* narrowed at each end. (C. anceps, *Willd. & ed.* 1.) — Var. STRIÁTULA has the *spikes oblong,* more densely flowered, and the *perigynia obovoid* with a shorter point. (C. striatula, *Michx.* C. conoidea, *Muhl.*, not of *Schk.* C. blanda, *Dew.*) — Var. PATULIFÒLIA, Dew., has the *radical leaves very broad* (1′–1½′), many-nerved, with a rather longer point. (C. plantaginea, *Schk.*, not of *Lam.*) — Open woods and copses; common. — A very variable species, as to the breadth of the leaves and length of the spikes; the culms are usually flattened or 2-edged above. An intermediate form occurs, with the broad leaves and slender spikes of var. patulifolia, but having the obovoid shortly pointed fruit of var. striatula, differing in the latter respect from the plant figured as C. plantaginea by Schkuhr.

80. **C. oligocárpa,** Schk. *Fertile spikes small,* 3–8-*flowered; the point of the perigynium slightly oblique, not recurved;* style very short, thickened towards the base; leaves rough only on the edge, *sheaths smooth.* (C. Sartwelliana, *Gay.*) — Woods, W. New York to Illinois and Kentucky. — Culm slender, 8′–12′ long; the fertile spikes ¼′–½′ in length.

81. **C. Hitchcockiàna,** Dew. Fertile spikes *very loosely* 3–4-*flowered; sheaths and upper side of the leaves roughly pubescent.* — Woods, New England to Illinois and Kentucky. — Culm 1°–2° high, stouter than the last, with very scabrous sheaths. The fruit is also larger (2½″ long); but in other respects the plants are similar.

§ 5. *Perigynia without a beak, smooth or downy, not inflated,* obovoid-triquetrous, with a minute obliquely bent white and membranaceous point, *reddish-brown or olive-colored at maturity: bracts reduced to colored sheaths, or with a short green prolongation:* leaves all radical, narrow or bristle-shaped. — DIGITÀTÆ.

82. **C. ebúrnea,** Boott. Sterile spike solitary; the *fertile* 3–4, *erect, about* 5-*flowered, approximated and elevated on long stalks above the staminate spike:* the lowest sometimes a little remote; perigynia obscurely nerved, smooth and shining, rather longer than the broad and obtuse membranaceous whitish scale. (C. alba, var. setifolia, *Dew.*) — Limestone rocks, N. New England to Kentucky, and northward. — A delicate species, 4′–10′ high, with bristle-shaped leaves,

forming dense tufts. The fertile spikes do not exceed 2″ – 3″ in length, and are about 1″ broad.

83. **C. pedunculàta,** Muhl. Spikes 3 – 5, *commonly* 4, *the uppermost sterile with* 2 – 3 *fertile flowers at the base, the rest fertile with a few staminate flowers at the apex, all on long stalks, remote,* 1 – 2 of the lowest near the base of the culm; sheaths with green tips much shorter than the stalks; *perigynia with a long attenuated base and a minutely notched orifice, somewhat downy,* especially on the angles, about the length of the broadly obovate abruptly awned or pointed dark-purple scale. — Dry woods and rocky hill-sides, New England to Penn., Wisconsin, and northward. — Culms 4′ – 10′ high, prostrate at maturity, growing in tufts partly concealed by the very long and narrow grassy leaves.

§ 6. *Perigynia with a straight or slightly bent more or less abrupt beak, hairy, not inflated,* terminating in a membranaceous notched or 2-toothed orifice: bracts short, either green and slightly sheathing or auriculate at the base, or small and resembling the scales: scales dark brown or purple with white margins, fading lighter or sometimes turning nearly white: staminate spike solitary; the fertile 2 – 3, nearly sessile (except in No. 84), erect. (*Culms mostly low and slender: leaves all radical, long and narrow.*) — MONTÀNÆ.

84. **C. umbellàta,** Schk. *Culms very short;* staminate spike sometimes with a few pistillate flowers; *fertile spikes* 4 – 5, ovoid, few-flowered; *the uppermost close to the sterile spike and sessile, the rest on stalks arising from the base of the stem* and of about equal height, appearing somewhat like a small corymb, nearly concealed by the long grassy leaves; perigynia ovoid, 3-angled, with a rather long abrupt beak, about the length of the ovate pointed scale. — Rocky hill-sides, New England to Penn., and northward. — Growing in dense grassy tufts, with culms 1′ – 3′, rarely 6′ high.

85. **C. Novæ-Ángliæ,** Schw. Sterile spike on a short stalk; the *fertile* 2 – 3, *ovoid, nearly sessile,* 3 – 5-*flowered, more or less distinct,* the lowest with a green and bristle-shaped or colored and scale-like awned bract; *perigynia obovoid, 3-angled, attenuated at the base into a short stalk,* minutely hairy (principally above), indistinctly nerved, *with a somewhat elongated 2-toothed beak deeply cleft on the inner side,* a little longer than the ovate pointed scale. (C. collecta, *Dew.* C. varia, var. minor, *Boott* (including var. Emmonsii). C. lucorum, *Kunze,* not of *Willd.?*) — Var. EMMÓNSII has the fertile spikes 5 – 10-flowered, aggregated, the uppermost close to the base of the staminate; or varying occasionally with the lowest on a long stalk near the base of the culm, concealed by the long grassy leaves. (C. alpestris, *Schw. & Torr.,* not of *Allioni.* C. Davisii, *Dew.,* not of *Schw. & Torr.* C. Emmonsii, *Dew.*) — Woody hills and mountains, N. New England to Ohio, and northward; also southward along the Alleghanies. — Grows in grassy tufts, with numerous very slender, often prostrate culms, varying from 4′ – 15′ in length. The var. is the prevailing form, but intermediate ones continually occur, differing in respect to the contiguity and size of the fertile spikes, and in the proximity of the uppermost to the base of the sterile one. The form of the perigynium varies with age; the mature ones in Kunze's figure of C. lucorum have the elongated beak of C. nigro-marginata, *Schw.* (possibly the C. lucorum of *Willd.*), whilst the plant delineated is clearly C. Novæ-Angliæ.

86. **C. Pennsylvánica,** Lam. *Sterile spike commonly on a short stalk, fertile* 1–3, *usually* 2, *approximate,* nearly sessile, ovoid, 4–6-*flowered, the lowest commonly with a colored scale-like long-awned bract; perigynia roundish-ovoid, with a short and abrupt minutely-toothed beak* about the length of the ovate pointed *chestnut-colored scale.* (C. marginata, *Muhl.*) — Dry woods and hill-sides, New England to Penn., Illinois, and northward.

87. **C. vària,** Muhl. *Sterile spike sessile; fertile* 2–3, *mostly* 3, *distinct,* on very short stalks, ovoid, 6–10-*flowered;* the lowest, and sometimes the 2 lower, *with green leaf-like bracts; perigynia obovoid, with an abrupt distinctly toothed beak,* about the length of the ovate pointed *light-brown scale.* (C. Pennsylvanica, var. Muhlenbergii, *Gray, Gram. & Cyp.*) — Dry wooded hills; common, especially northward. Closely resembles the last; but has wider, shorter, and more rigid glaucous leaves.

88. **C.** PRÆCOX, Jacq. *Sterile spike club-shaped; fertile* 2–3, *oblong-ovoid, aggregated near the base of the sterile spike, sessile,* or the lowest sometimes on a very short stalk, with a leaf-like bract scarcely exceeding the spike; *perigynia ovoid-triangular, attenuated at the base, with a short beak and nearly entire orifice,* about equal to the ovate pointed dark-brown scale; achenium obovoid with a prominent ring at the apex surrounding the base of the style; culm 3′–6′ high; leaves short, rather rigid. (C. verna, *Villars, Dew.*, not of *Schk.*) — Rocky hills, Salem and Ipswich, Massachusetts. (Nat. from Eu.)

89. **C. Richardsònii,** R. Brown. *Sterile spike peduncled,* cylindrical; *fertile* 1 *or* 2, sessile or short-stalked, approximate, *oblong,* longer than the scale-like brownish and mostly short-pointed bracts; *perigynia obovoid-triangular, with a tapering base, obtuse, nearly beakless,* the short point with an almost entire orifice, rather shorter than the ovate acutish brown or chestnut-colored scale; culm (5′–9′ high) and rigid leaves rough. — Dry ground, near Rochester, New York (*Dewey*); prairies of Illinois (*Mead*); Wisconsin (*Sartwell*), and northward. — A well-marked species, in aspect most like No. 86.

90. **C. pubéscens,** Muhl. Sterile spike usually sessile; *fertile* 3–4, *oblong or cylindrical, loosely flowered,* somewhat approximated, or the lowest a little remote, on a short stalk, with a narrow leaf-like bract about the height of the culm; *fruit ovoid and sharply triangular, downy, attenuated at the base, with an abrupt slender beak nearly entire at the orifice,* a little longer than the ovate abruptly-pointed white scale; *culm and leaves soft-downy.* — Moist woods and meadows, New England to Wisconsin and Kentucky. Differs from the other species of this section in its greater size and in aspect, and especially in the sharply angled perigynium.

§ 7. *Perigynia slightly inflated, with a short beak, terminating in an entire or slightly notched orifice:* staminate spike solitary, stalked (in No. 91 usually pistillate at the summit): *culms tall and leafy.* — ANÓMALÆ.*

91. **C. miliàcea,** Muhl. Staminate spike commonly fertile at the summit; *fertile spikes* 3, cylindrical, rather slender, loosely flowered at the base, on

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* The species here combined, merely to avoid the multiplication of small sections, do not constitute a natural group, but present certain points of affinity with several others.

filiform nodding stalks; bracts exceeding the culm, with short or nearly obsolete sheaths; *perigynia ovoid-triangular*, very smooth and thin, with an entire or very minutely notched orifice, longer than the ovate short-awned white scale. (C. prasina, *Wahl.*) — Rills and wet meadows; rather common. — In aspect somewhat resembles the smaller short-awned forms of No. 51, with which it has points of affinity, though differing materially in the 3 stigmas and triangular fruit.

92. **C. scabràta,** Schw. *Fertile spikes* 4 – 5, cylindrical, erect, rather distant, *densely flowered*, the lower on long stalks; *bracts without sheaths*, exceeding the culm; *perigynia ovoid*, contracted at the base, *prominently few-nerved, rough*, spreading at maturity, with an obliquely notched beak, longer than the ovate slightly ciliate brown scale; *culm, leaves, and bracts very rough.* — Wet meadows and swamps, New England to Penn., Michigan, and northward.

93. **C. Sullivàntii,** Boott. *Fertile spikes* 3 – 5, *commonly* 4, *narrowly cylindrical, erect, loosely flowered*, the upper approximate, the lowest often remote, tapering towards the base and slightly compound, *all on rough stalks*; bracts sheathing, not exceeding the *hairy culm*; *perigynia elliptical, hairy*, slightly stalked, with an entire or notched orifice, rather longer than the ovate *hairy-fringed rough-awned white scale.* — Woods, Columbus, Ohio, *Sullivant.* — About 2° high, with hairy leaves and bracts, and slender fertile spikes 1′ – 1½′ long. Resembles the next, but is at once distinguished by the erect spikes, hairy and nerveless fruit, and hairy leaves.

§ 8. *Perigynia slightly inflated*, *3-angled, smooth and shining, green, with a straight tapering beak* terminating in 2 small membranaceous teeth (nearly obsolete in No. 96): lower bracts green and sheathing: pistillate scales tawny, becoming white: staminate spike solitary, stalked: *pistillate spikes* 3 – 4, *loosely flowered, all on long and filiform nodding stalks.*

* *Fertile spikes long and slender, remote: perigynia few-nerved:* bracts equalling or exceeding the culm. — DÉBILES.

94. **C. arctàta,** Boott. *Fertile spikes few-flowered and narrowed towards the base; perigynia ovoid-elliptical, triangular, short-stalked, rather blunt at the base*, the beak very short, longer than the pointed scale. (C. sylvatica, *Dew.*, not of *Hudson.* C. Knieskernii, *Dew.*) — Woods and meadows, New England to Pennsylvania, and northward.

95. **C. débilis,** Michx. Staminate spike occasionally fertile at the apex; *fertile spikes with loose alternate flowers, on a somewhat zigzag rhachis; perigynia oblong, tapering at each end*, twice as long as the ovate-lanceolate awned scale. (C. tenuis, *Rudge.* C. flexuosa, *Muhl.*) — Moist meadows, N. New England to Pennsylvania, and southwestward.

* * *Fertile spikes short: perigynia nerveless*, or very obscurely nerved in No. 97; bracts erect, shorter than the culm. — FLÉXILES.

96. **C. capillàris,** L. *Fertile spikes commonly* 3, *minute, with about* 6 *alternate flowers; perigynia oblong-ovoid, contracted at the base, tapering into a long slightly serrulate beak*, with an oblique nearly entire orifice, longer than the ovate scale. — Point de Tour, Lake Michigan; alpine summits of the White Mountains, New Hampshire, and high northward. — An extremely delicate species, 4′ – 6′ high, with spikes ¼′ – ½′ long, and a line or less in width. (Eu.)

97. **C. fléxilis,** Rudge. *Sterile spike short and club-shaped; fertile spikes oblong*, or sometimes with a few staminate flowers at the base and becoming club-shaped; the upper bracts short and scale-like, the lower bristle-shaped, very slightly sheathing; perigynia ovoid, obscurely nerved, tapering into a beak about the length of the ovate *hairy-fringed scale;* leaves pale green and glaucous, and with the bracts fringed with delicate hairs. (C. blepharóphora, *Gray.*) — Moist, shady places, W. New York, Lake Superior, and northward.

§ 9. *Perigynia slightly inflated, obtusely 3-angled, nerved, smooth, tapering into a rather rough beak*, with two distinct membranaceous teeth (obscure in No. 101), *becoming tawny or yellow at maturity* (or in No. 98 more or less spotted with purple): achenium obovate-triquetrous, contracted at the base: staminate spike solitary, stalked (sessile in No. 101). — FLAVÆ.

* *Perigynia erect: bracts with long sheaths, not exceeding the culm.*

98. **C. lævigàta,** Smith. *Fertile spikes* 3, *cylindrical, remote, on exserted nodding stalks;* perigynia ovoid, tapering into a 2-cleft beak, rather longer than the light-brown *pointed and awned scale; culm smooth.* (C. Greeniana, *Dew.*) — Massachusetts (Tewksbury? *B. D. Greene*). Introduced? (Eu.)

99. **C. fúlva,** Good. *Fertile spikes* 2 – 3, *oblong or ovoid, erect, remote, the lowest on an exserted stalk;* perigynia ovoid, not much exceeding the dark-brown *scarcely pointed awnless scale; culm rough.* (C. binervis, *Dew.*, not of *Smith.*) — Pond at Tewksbury, Massachusetts, *B. D. Greene.* (Eu.)

* * *Perigynia spreading or reflexed, longer than the scale: bracts with short sheaths, much exceeding the smooth culm.* (Staminate spike often pistillate at the apex or towards the centre; fertile spikes erect.)

100. **C. flàva,** L. *Fertile spikes* 2 – 4, *roundish-ovoid*, compactly flowered, the upper approximated, the lowest remote on a short exserted stalk; *bracts spreading or reflexed; perigynia tapering* from an ovoid contracted base into a *narrow curved beak*, widely spreading or reflexed at maturity. — Wet meadows, especially northward. — Whole plant of a yellowish hue, 6′ – 15′ high, with spikes ½′ – ¾′ in length. (Specimens, appearing to be merely small forms of this species, have been referred by Prof. Dewey to C. lepidocarpa, *Tausch;* but they by no means accord, nor does his character, either with the description, or with authentic specimens of Kunze.) (Eu.)

101. **C. Œderi,** Ehrh. *Sterile spike commonly sessile; fertile* 2 – 4, *oblong-ovoid, closely aggregated*, or the lowest rather remote, on very short stalks, densely flowered, sometimes staminate at the apex; leaves and *bracts rigidly erect; perigynia ovoid, with a short and rather abrupt minutely notched beak*, spreading horizontally at maturity. (C. viridula, *Michx.*, not of *Schw. & Torr.* C. irregularis, *Schw.*) — Wet rocks, especially on limestone, New England to Ohio, Lake Superior, and northward. — Resembles the last; but the fertile spikes and perigynia are much smaller, and the beak of the latter is more abrupt, shorter, and straight. (Eu.)

§ 10. *Perigynia slightly inflated*, obtusely 3-angled, nerved, *rough or woolly*, with an abrupt straight beak: bracts leaf-like, with short sheaths: scales dark-purple or brown.

* *Perigynia of a thick or somewhat leathery texture, with 2 short and diverging membranaceous teeth: bracts much exceeding the nearly smooth culm:* staminate spikes 2–3, the uppermost stalked, the lower short and sessile: fertile spikes 1–2, usually 2, erect, remote, sessile or on very short stalks. — LANUGINÒSÆ.

102. **C. filifórmis,** L. *Fertile spikes ovoid or oblong,* the upper often staminate at the apex; *perigynia ovoid, densely woolly, obscurely nerved, the orifice scarcely prolonged into a beak* terminating in 2 slightly hairy teeth; *leaves and bracts narrow and involute;* culm very slender. — Peat-bogs, New England to Penn., Wisconsin, and northward. (Eu.)

103. **C. lanuginòsa,** Michx. *Fertile spikes oblong or cylindrical; perigynia ovoid, roughly hairy, conspicuously nerved, with a short but distinct beak* terminating in 2 very hairy sharp teeth; *leaves and bracts flat.* (C. pellìta, *Muhl.*) — Swamps and wet meadows, New England to Kentucky, and northward. — Extremely like the last, from which it differs in the commonly longer fertile spikes, stouter culm, flat leaves, and especially in the distinct flattish and hairy beak of the perigynium, with longer and sharper teeth. — This species has often the fruit in a diseased state, when it becomes more inflated, of an orange color, and has an abortive achenium.

* * *Perigynia thin, downy, or roughly dotted, the beak terminating in a thin and scarious oblique orifice, either entire or slightly notched:* bracts rigidly erect, shorter than the sharply triangular rough culm. — SCARIÒSÆ.

104. **C. vestìta,** Willd. Sterile spikes 1–2, the uppermost cylindrical, shortly stalked; fertile 1–2, approximate, sessile, ovoid or oblong, sometimes staminate at the apex; *perigynia ovoid, downy, with a slightly oblique beak terminated by a thin membranaceous notched orifice,* a little longer than the ovate pointed scale; *leaves flat,* shorter than the stout and rigid culm. — Sandy soils, growing in tufts, New England to Penn. and southward; rather rare. — Resembling the two last in external appearance, but readily distinguished by the membranaceous beak of the fruit, which is red at the base and white and transparent at the orifice; and the style is twisted within the perigynium.

105. **C. polymórpha,** Muhl. (in part.) Sterile spikes 1–4, the uppermost on a long stalk; the lower short, often with a few fertile flowers at the base; *fertile spike solitary,* or rarely 2, remote, oblong-cylindrical, sometimes staminate at the apex, erect, on partly exserted stalks; *perigynia oblong-ovoid, 8–10-nerved, very minutely roughened with granular dots,* the slightly-bent beak tapering to the *entire* (*reddish*) *orifice,* longer than the ovate scarcely-pointed purple scale. (C. Halseyana, *Dew.* & *ed.* 1. C. striata, *Torr. N. Y. Fl.*, not of *Michx.*) — Varies, with the fertile spikes filiform, and the flowers alternate and very distant on the rhachis. — Upland meadows, E. Mass. to Penn. and W. New York. — Culm rather slender, much taller (12′–18′) than the rigid leaves. Though a somewhat variable plant, it is readily distinguished from the next, with which it has been confounded, by the characters here given, especially by the *entire, membranaceous* orifice of the fruit.

§ 11. *Perigynia moderately inflated, conspicuously many-nerved, smooth* (except in No. 109), *with a straight beak terminating in 2 rigid more or less spreading teeth:*

bracts long and leaf-like, with very short sheathing bases, much exceeding the culm (about equal to it in No. 106): *staminate spikes* 1 – 5.

* *Perigynia with a very short and thick beak, and with short and thick slightly spreading teeth.* — LACÚSTRES.

106. **C. striàta,** Michx. (not of ed. 1.) Sterile spikes 2 – 3, the uppermost stalked; *fertile spikes* 1 – 2, *oblong*, erect, remote, on very short stalks; *perigynia ovoid, abruptly contracted into a slightly serrulate beak*, longer than the pointed purple scale. (C. polymorpha, *ed.* 1.) — Wet places, New Jersey to Virginia, and southward.

107. **C. lacústris,** Willd. Sterile spikes 2 – 5, the uppermost stalked; *fertile spikes* 2 – 3, *oblong-cylindrical, stout*, erect, remote, nearly sessile, or the lowest on a short stalk; *perigynia oblong*, but little exceeding the lanceolate awned scale; culm sharply triangular, rough; sheaths very short, smooth. (C. riparia, *Muhl.*, not of *Curtis.*) — Swamps and borders of lakes and rivers; common. — A robust species, 3° – 5° high, with leaves ¼' – ⅓' wide.

* * *Perigynia with an elongated tapering beak, and long widely spreading or recurved sharp and spine-like teeth.* — ARISTÀTÆ.

+ *Staminate spikes* 2 – 5, *some occasionally bearing a few fertile flowers.*

108. **C. aristàta,** R. Brown. *Fertile spikes* 2 – 4, *cylindrical*, erect, remote, the lower on partly exserted short stalks; *perigynia tapering from an ovoid base into a deeply 2-forked beak*, longer than the ovate-lanceolate awned scale culm smooth; *sheaths and under surface of the leaves pubescent.* (C. atheròdes *Spreng.*) — Lake shores and river-banks, N. New York to Michigan, and northwestward. — Culm 2° – 3° high: leaves 2" – 3" wide. Fertile spikes 2' – 3' long, often rather loosely flowered towards the base.

109. **C. trichocárpa,** Muhl. *Fertile spikes* 2 - 3, *oblong-cylindrical*, erect, remote, one of them sometimes staminate at the apex, the lower on exserted stalks, rather loosely flowered towards the base; *perigynia very hairy*, shaped as the last, longer than the ovate taper-pointed light-brown scale; culm sharply triangular, smooth except near the top, *sheaths and under surface of the leaves smooth.* (C. striata, *ed.* 1, not of *Michx.*) — Marshes and lakes; common, especially northward.

+ + *Staminate spike solitary*, with a filiform bract, occasionally bearing a few fertile flowers towards the apex or base: fertile spikes 3 – 5, cylindrical, densely flowered, on long exserted and at length drooping stalks: perigynia widely spreading, reflexed at maturity.

110. **C. comòsa,** Boott. Fertile spikes large (1½' – 2½' long, and ½' – ⅔' wide), the lowest sometimes very remote; *perigynia tapering from a stalked ovoid-triangular base into a long deeply 2-forked beak, the sharp elongated teeth widely spreading* or somewhat recurved; scales lanceolate with a long bristle-shaped awn shorter than the mature fruit; culm rough and triquetrous. (C. furcata, *Ell.*, not of *Lapeyr.* C. Pseudo-Cyperus, *Schw. & Torr.*, *Dew.*, *&c.*, in part, not of *L.*) — Wet places; rather common. — A robust species 2° – 3° high, formerly confounded with the next, which it greatly resembles; but it differs especially in the larger fertile spikes, longer beak of the fruit, and the longer, smooth and widely-spreading teeth, giving to the spikes a comose or bristly appearance.

111. **C. Pseudo-Cypèrus,** L. Fertile spikes (1½′–2¼′ long, and about ½ wide) sometimes slightly compound at the base; *perigynia* shaped as the last species, but *with a shorter beak, and shorter less spreading teeth;* scale about the length of the mature fruit. — Border of lakes and in bogs, New England to Pennsylvania, and northward. — Somewhat smaller than the last species in all its parts. (Eu.)

112. **C. miràta,** Dew. Fertile spikes about 2, long-cylindrical, rather dense, somewhat erect; perigynia ovate-conical, with a long 2-forked beak, ribbed, glabrous, about the length of the ovate bristle-pointed or long-awned scale; culm (about 2° high) rough. — Shore of Lake Ontario, in Monroe County, New York, *Dr. Bradley*. (Having no specimen, the character is taken from Dewey's description in Wood's Bot. The Georgian plant referred to it is to be excluded.)

§ 12. *Perigynia much inflated, conspicuously many-nerved, smooth, with a long tapering 2-toothed beak:* bracts leaf-like, much exceeding the culm: scales tawny or white: *staminate spike stalked, always solitary.* — LUPULÌNÆ.

* *Bracts with very short or obsolete sheaths.*

113. **C. hystricìna,** Willd. Sterile spike often bearing a few fertile flowers at the base or apex; *fertile spikes* 2–4, *oblong-cylindrical,* densely flowered, the uppermost on a very short stalk, the others *on long stalks and at length nodding,* the lowest often very remote; perigynia spreading, tapering from an ovoid base into a long slender *beak with sharp smooth teeth,* longer than the awned scale. — A variety with shorter ovoid spikes, the lowest very remote on a filiform stalk, 4′–6′ long, with rather smaller perigynia not much longer than the awn, is C. Cooleyi, *Dew.* — Wet meadows; common. — Plant pale or yellowish green, with fertile spikes ¾′ to 1½′ long. Distinguished from No. 111 by the more inflated, less diverging fruit, its beak longer and the teeth shorter; and from No. 114 by the smaller nodding spikes, many-nerved perigynium, and the longer and smooth teeth of the beak.

114. **C. tentaculàta,** Muhl. *Fertile spikes* 2–3, *ovoid, oblong, or cylindrical,* densely flowered, approximate and diverging horizontally, *the uppermost sessile, the lower on short exserted stalks;* perigynia spreading, tapering from an ovoid few- (about 10-) nerved base into a long slender *beak with short minutely-serrulate teeth,* much longer than the lanceolate awned scale. (C. rostrata, *Muhl.,* not of *Michx.*) — Wet meadows; very common.

115. **C. intumèscens,** Rudge. *Fertile spikes* 1–3, *ovoid, loosely few- (5–8-) flowered, closely approximated, sessile,* or the lower on a very shortly exserted peduncle; *perigynia erect-spreading,* tapering from an ovoid 15–20-nerved base into a long *beak, slightly rough towards the apex.* (C. folliculata, *Schk., Michx.,* not of L.) — Wet meadows and swamps; very common. — Culm slender, about 18′ high, with the fertile spikes crowded compactly together: perigynia 6″–7″ long.

116. **C. Gràyii,** Carey. *Fertile spikes* 2 (sometimes single), *globose, densely- (25–30-) flowered, separate and distinct, on short exserted peduncles; perigynia spreading and deflexed,* tapering from an ovoid 25–30-nerved base into a long *smooth and shining beak.* — Low meadows on the banks of the Mohawk and of

Wood Creek, New York. Also Columbus, Ohio, *Sullivant*. — Culm robust, 3° high: perigynia ½′ in length. — Flowers in July, a month later than the last.

* * *Bracts conspicuously sheathing.*

117. **C. folliculàta,** L. Staminate spike small, short-stalked, or often sessile; *fertile spikes* 3 – 4, ovoid, very remote, the lower *on exserted peduncles; perigynia* erect-spreading, tapering from an oblong base, *rather exceeding the ovate white long-awned scale.* (C. xanthophysa, *Wahl.*) — Peat-bogs, New England to Penn., and northward, and sparingly southward. — A robust plant, 2° – 4° high, of yellowish appearance, with long foliaceous bracts, and leaves ½′ wide.

118. **C. rostràta,** Michx. Staminate spike small, nearly sessile; *fertile spikes* 1 – 3, commonly 2, roundish-ovoid, the lower rather distant *on a short exserted peduncle; perigynia* erect or somewhat spreading, tapering from an oblong slightly inflated base into a long slender beak *twice the length of the blunt light-brown scale.* (C. xanthophysa, var. nana and minor, *Dew.*) — Cold bogs, mountains of N. New York, New Hampshire, and northward. — Resembles the last; but smaller in all its parts, rigidly erect, and with narrow leaves.

119. **C. subulàta,** Michx. *Fertile spikes* 3 – 5, *very remote,* on included peduncles *loosely few-* (4 – 8-) *flowered,* commonly with a few staminate flowers at the apex; *perigynia awl-shaped, strongly reflexed at maturity;* the orifice of the long slender *beak furnished with 2 sharp and rigidly deflexed teeth.* (C. Collinsii, *Nutt.* C. Michauxii, *Dew.*) — Cedar swamps, New Jersey to Rhode Island (*Olney*) near the coast, and far northward: rare.

120. **C. lupulìna,** Muhl. *Fertile spikes* 2 – 3, *oblong-ovoid,* erect, the upper approximate, the lower on more or less exserted stalks; *perigynia erect, tapering from the ovoid very inflated base* into a conical slightly serrulate beak, much longer than the lanceolate awned scale. — Var. POLYSTÀCHYA, Schw. & Torr. (C. lupiniformis, *Sartwell*), has 4 – 5 longer *cylindrical* fertile spikes, the lowest remote on a long peduncle; and the perigynia more distinctly serrulate on the angles of the beak. — Swamps and wet meadows; common. — A coarse robust species, with very thick spikes 2′ – 3′ in length; the leaves and long leafy bracts 3 – 4 lines wide, very rough on the margin.

§ 13. *Perigynia much inflated, obovoid or obconic, few-nerved, smooth, with an extremely abrupt and very long slightly roughened beak,* terminated by 2 distinct rather short membranaceous teeth, tawny-brown or straw-colored at maturity, spreading horizontally, or the lower deflexed: bracts leaf-like, much exceeding the culm. — SQUARRÒSÆ.

* *Spikes* 1 – 3, mostly solitary, very rarely 4 – 5, all of them *principally pistillate,* with more or less staminate flowers at the base: sheaths of the upper bracts obsolete.

121. **C. squarròsa,** L. *Fertile spikes ovoid or oblong,* obtuse and very thick, rigidly erect, on short stalks; perigynia longer than the lanceolate pointed scales, which are nearly concealed by the densely-crowded bases of the mature fruit. (C. typhina, *Michx.*) — Low meadows and copses, S. New England to Michigan and southward. — Remarkable for its densely-flowered, short and thick spikes, about 1′ long, to which the spreading beaks of the perigynia give a bristly appearance.

* * *Spikes 4–7; the terminal one entirely staminate,* small and linear, or with some fertile flowers at the apex: the rest all pistillate: bracts very long, sheathing.

122. **C. stenólepis,** Torr. *Fertile spikes cylindrical,* obtuse, the upper approximated, nearly sessile on the zigzag stem, the lower remote on exserted stalks, all erect, very densely flowered; perigynia shorter than the long awn-like scales. (C. Frankii, *Kunth.* C. Shortii, *Steud.*, not of *Torr.*) — Marshes, W. Penn.? and Virginia to Illinois, and southwestward. — Somewhat resembling the last; but the spikes are narrower and more numerous, and of a still more bristly appearance from the projecting points of the scales: occasionally all are fertile, the uppermost having no staminate flowers.

§ 14. *Perigynia much inflated, nerved* (nerveless in No. 132), *smooth and shining, becoming straw-colored at maturity, with a tapering more or less elongated 2-toothed beak:* bracts leaf-like, with very short or obsolete sheaths (conspicuously sheathing in No. 123), much exceeding the culm (except in No. 132): scales brown or tawny: *staminate spikes 2–5 rarely 1, stalked.* — VESICÀRIÆ.

123. **C. retrórsa,** Schw. Sterile spikes 1–3, the uppermost occasionally with a few fertile flowers, the rest more or less pistillate at the base; *fertile spikes 4–6, oblong-cylindrical, erect, the upper approximate and clustered* on short or included stalks, *the lowest remote* on a long exserted stalk, and (with one or more of the others) often bearing 1–2 short branches at the base; *perigynia crowded, spreading and at length reflexed,* strongly (few-) nerved, tapering from an ovoid contracted base into a *conspicuously toothed beak much longer than the lanceolate scale.* (C. reversa, *Spreng.*) — Marshy borders of streams, New England to Penn., Wisconsin, and northwestward. — Culm nearly smooth: leaves and bracts 3″–4″ wide, much exceeding the spikes, which are 1′–1½′ long.

124. **C. gigántea,** Rudge. *Sterile spikes several* (3–5); *perigynia horizontally spreading* and less tumid than in No. 120: otherwise very like it, but a still larger plant. — Swamps, along rivers, from the Ohio (near Louisville, Kentucky, *Short*) southward.

125. **C. Schweinitzii,** Dew. Sterile spikes commonly 2, the lower often pistillate at the base; *fertile spikes 3–4, cylindrical, somewhat drooping, densely flowered, often staminate at the apex,* and occasionally the lower rather compound at the base, on smooth nearly included stalks; *perigynia erect,* oblong-ovoid, few-nerved, tapering into a long and smooth *short-toothed beak, a little longer than the lanceolate long-awned scale.* — Wet swamps, New England, New Jersey, W. New York, and northward; not common. — Culm 10′–15′ high, smooth: bracts and leaves 2″–3″ wide, smooth except the margins, much exceeding the culm: fertile spikes (1½′ to 2½′ long, rather narrow) and the whole plant turning straw-color.

126. **C. vesicària,** L. Sterile spikes 2–3; *fertile spikes mostly 2, rarely 3* or solitary, *oblong or cylindrical, stout, approximate,* the upper sessile, the lower on a short *rough stalk; perigynia oblong-ovoid, 17-nerved at base,* 10-nerved above, with a short tapering beak longer and broader than the pointed or long-tapering *awnless scale;* culm sharply angled and rough; leaves and bracts green, equalling or rather longer than the culm. — N. New England? and northward. —

Distinguished from the next by the shorter fertile spikes, on rough stalks, and by the more oblong perigynium, many-nerved at the base. (Eu.)

127. **C. monile,** Tuckerman. Sterile spikes 3, rarely 2 or 4; *fertile spikes mostly* 2, rarely 3 or solitary, *long-cylindrical, remote, on smooth stalks,* the lowest often nodding and *loosely flowered; perigynia roundish-ovoid,* about 10-nerved, with a short tapering beak terminating in an oblique orifice, much longer and broader than the taper-pointed *awnless scale; culm slender,* sharply angled and rough; leaves and bracts green, longer than the culm. (C. bullata, var. cylindracea, & C. vesicaria, var. cylindracea, *Dew.*) — Bogs, New England to Kentucky, and northward. — Less robust than the last.

128. **C. ampullàcea,** Good. Sterile and fertile *spikes* 2-3, *most frequently* 2 *of each, oblong or long-cylindrical,* remote, sessile, or the lower on short and smooth sometimes nodding stalks, the lowest loosely flowered at the base; *perigynia roundish-ovoid,* about 17-nerved at the base and 10-nerved at the apex, abruptly contracted into a short cylindrical beak; *scales lanceolate, awnless, or the upper with a rough awn shorter than the perigynium;* culm slender, obtusely angled, smooth; leaves and bracts glaucous, often involute, longer than the culm. — Var. UTRICULÀTA. Staminate spikes 3-4; fertile usually 3; *perigynia oblong-elliptical, tapering; scales lanceolate, tapering, terminated (especially the lowest) by a long rough awn;* culm stout, spongy at the base, smooth or rough towards the summit; leaves and bracts glaucous, wide and much longer than the culm. (C. utriculata, *Boott.*) — In swamps; common northward, and from Arctic America to the Pacific. — Differs from the last two in the smooth obtuse-angled culm, glaucous leaves, and particularly by the awned scale. The var. is the prevailing form in the United States, and is a larger and stouter plant; but the more elliptical fruit, and awned lower scales, do not appear sufficiently constant to separate it specifically. (Eu.)

129. **C. cylindrica,** Schw. Sterile spikes about 2; *fertile spikes* 2-3, *commonly* 3, *oblong or cylindrical,* stout, somewhat approximate, *on rough stalks,* the lowest often nodding; *perigynia thin and transparent, much inflated, oblong-ovoid, obliquely erect,* tapering into a rather abrupt long-cylindrical *smooth beak,* much longer and broader than the ovate pointed or rough-awned scale; bracts very long and, like the narrow leaves, rough and exceeding the rough culm. (C. bullata, *Amer. auth.*, not of *Schk.* C. Tuckermani, *Dew.*, *Boott.*) — Swamps, W. New York to Kentucky, and northward. — Differs from the next principally in the more numerous and longer fertile spikes, and the larger, more inflated and membranaceous ascending fruit, with smooth beaks.

130. **C. bullàta,** Schk. Sterile spikes 2-3; *fertile spikes most frequently only one,* sometimes 2, approximated, *oblong or cylindrical,* stout, sessile or *on short smooth stalks; perigynia spreading, ovoid,* tapering into a long-cylindrical *rough beak,* much wider and longer than the obtusely-pointed lanceolate *awnless scale;* bracts and leaves narrow, about the length of the smooth or roughish culm. (C. cylindrica, *Tuckerman, Torr. N. Y. Fl.* (excl. syn.), not of *Schw.*) — Wet meadows; not rare, especially southward. — Well distinguished from the last by the short and stout, commonly solitary fertile spike, which has a squarrose appearance at maturity from the widely-spreading fruit; its beak minutely (but distinctly) serrulate.

131. **C. oligospérma,** Michx. Sterile spikes 1 – 2, slender; *fertile spikes* 1 – 2, *short, ovoid, few-flowered,* the lower on a very short stalk; perigynia ovoid, tapering into a short minutely toothed beak, not much longer than the ovate awnless scale; culm very slender; *leaves and bracts linear, at length involute.* (C. Oakesiana, *Dew.*) — Borders of lakes and ponds, especially on mountains, New England, N. New York, Wisconsin, and northward.

132. **C. longiróstris,** Torr. Sterile spikes usually 3, at the summit of a long slender stalk; the lower often bearing some fertile flowers; *fertile spikes* 2 – 3, *cylindrical,* more or less distant, *on long filiform at length drooping stalks, loosely flowered; perigynia globose-ovoid,* smooth and shining, abruptly contracted into a *very long and narrow beak,* which is rough on the margin, oblique and 2-cleft at the *membranaceous orifice,* a little longer than the lanceolate light-colored or white scale. (C. Sprengelii, *Dew.*) — Shady rocks, N. New England to Wisconsin, and northward. — Though agreeing with the species of this section in the numerous staminate spikes and the long-beaked fruit, this plant is perhaps as nearly allied to No. 97.

ORDER 134. GRAMÍNEÆ. (GRASS FAMILY.)

Grasses, with usually hollow stems (culms) *closed at the joints, alternate 2-ranked leaves, their sheaths split or open on the side opposite the blade; the hypogynous flowers imbricated with 2-ranked glumes or bracts:* the outer pair (*glumes* proper, *calyx,* L.) subtending the spikelet of one or several flowers; the inner pair (*paleæ, outer perianth,* R. Br.) enclosing each particular flower, which is usually furnished with 2 or 3 minute hypogynous scales (*squamulæ,* Juss., *corolla,* Micheli, *lodiculæ,* Béauv.). Stamens 1 – 6, commonly 3: anthers versatile, 2-celled, the cells distinct. Styles mostly 2 or 2-parted: stigmas hairy or feathery. Ovary 1-celled, 1-ovuled, forming a seed-like grain (*caryopsis*) in fruit. Embryo small, on the outside and at the base of the floury albumen. — Roots fibrous. Sheath of the leaves usually more or less extended above the base of the blade into a scarious appendage (*ligule*). Spikelets panicled or spiked. Inner (upper) palea usually 2-nerved or 2-keeled, therefore probably consisting of two united. — A vast and most important family, as it furnishes the cereal grains, and the principal food of cattle, &c.

Synopsis.

TRIBE I. **POACEÆ,** R. Brown Spikelets 1 – many-flowered, when more than one-flowered centripetal in development; the lowest flowers first developing, the *uppermost,* if any, imperfect or abortive, the rest all alike in the spikelet (perfect, or occasionally monœcious or diœcious); only in a few exceptional cases with the lowest of the several flowers less perfect than the upper (viz. staminate only in Arrhenatherum and Phragmites, neutral in Uniola, Ctenium, &c.).

Subtribe 1. ORYZEÆ. Spikelets 1-flowered, in panicles, the flowers often monœcious. Glumes abortive or wanting! Inner paleæ 3-nerved! Squamulæ 2 Stamens 1 – 6.

1. LEERSIA. Flowers perfect, strongly flattened contrary to the awnless paleæ
2. ZIZANIA. Flowers monœcious. Paleæ convex; the lower one awned in the fertile flowers.

Subtribe 2. Agrostideæ. Spikelets 1-flowered, perfect, occasionally with the rudiment or abortive pedicel of a second flower above, panicled, or the panicle sometimes contracted into a cylindrical spike or head. Stamens 1 – 3.

* Phleoideæ. Glumes equal, strongly keeled, laterally flattened, boat-shaped, somewhat herbaceous, as well as the paleæ. Squamulæ 2. Grain free. Inflorescence densely spiked.

3. ALOPECURUS. Glumes united at the base. Lower palea awned, the upper wanting.
4. PHLEUM. Glumes distinct. Paleæ 2, the lower truncate and awnless

* * True Agrostideæ. Glumes equal, or often unequal, concave or keeled, membranaceous. Paleæ membranaceous (except in part of No. 12). Squamulæ 2. Grain free Inflorescence panicled, open, or often contracted (glomerate), but not strictly spiked.

+- Glumes and paleæ neither awned, bristle-bearing, nor mucronate, naked. Flower sessile in the glumes, naked at the base; the lower palea 1-nerved. Fruit deciduous.

5. VILFA. Seed adherent to the closely investing pericarp, forming a caryopsis, or true grain, as in most Grasses. Panicle spiked or contracted
6. SPOROBOLUS. Seed loose in the pericarp (utricle) Panicle spiked or diffuse.

+- +- Glumes or the (3 - 5-nerved) lower palea awned, bristle-pointed, or mucronate (except in some species of Agrostis) Flower raised on a more or less evident stalk (callus) in the glumes, naked, or barely hairy, at the base

7. AGROSTIS. Glumes equal, or the lower one rather longer, pointless, exceeding the very thin blunt paleæ. Lower palea pointless, commonly awned on the back; the upper sometimes wanting. Panicle open.
8. POLYPOGON. Glumes nearly equal long-awned, much longer than the paleæ, the lower of which is often short-awned below the apex. Stamens 3 Panicle contracted.
9. CINNA. Glumes acute, the lower about equalling, and the upper slightly exceeding, the similar paleæ. Stamen 1. Paleæ raised on a distinct naked stalk, beardless, the lower one short-awned or bristle-pointed just below the tip; the upper 1-nerved.
10. MUHLENBERGIA. Lower glume mostly smaller. Paleæ chiefly hairy-bearded at the base, the tip of the lower one mucronate-pointed or awned. Stamens 3.
11. BRACHYELYTRUM Lower glume nearly obsolete, and the upper minute. Lower palea long-awned from the tip; the upper grooved on the back and bearing a long and slender naked pedicel of an abortive second flower. Stamens 2.

+- +- +- Glumes and paleæ not bristle-pointed. Flower hairy-tufted at the base.

12. CALAMAGROSTIS. Lower palea mostly awned on the back, shorter than the glumes.

* * * Stipeæ. Paleæ coriaceous, or indurated in fruit, commonly shorter than the membranaceous glumes, on a rigid callus; the lower involute, terete, closely enclosing the upper and the grain, mostly 1 – 3-awned at the apex Squamulæ mostly 3. Inflorescence racemose or panicled: spikelets usually large, the flower deciduous from the persistent glumes.

13. ORYZOPSIS. Awn simple, straight, deciduous from the palea, or sometimes wanting.
14. STIPA. Awn simple, twisted below. Callus pointed at the base
15. ARISTIDA. Awn triple. Upper palea small. Callus pointed at the base

* * * * Palea coriaceous or cartilaginous, awnless. Here the following would be sought by the student who overlooked the pair of rudimentary flowers in No 55, and was not acquainted with the recondite theoretical structure of No 56 and 57.

55. PHALARIS. Spikelets laterally flattened. A rudiment at the base of each palea.
56. MILIUM. Spikelets dorsally flattish, not jointed with the pedicels: flowers all alike.
57. AMPHICARPUM. Spikelets of two sorts, the fertile subterranean, those of the panicle separating by a joint without ripening grain.

Subtribe 3. Chlorideæ. Spikelets (rarely 1-flowered, usually) 2 - several-flowered, with one or more of the upper flowers imperfect, disposed in one-sided spikes! Glumes persistent, the upper one looking outward Rhachis (axis) jointless Spikes usually racemed or digitate. Stamens 2 or 3.

* Spikelets strictly 1-flowered

58. PASPALUM might be looked for here, having to all appearance merely 1-flowered spikelets
16. SPARTINA. Spikelets imbricated, 2-ranked, flat, crowded in alternate spikes.

* * Spikelets imperfectly several-flowered, but only one perfect flower, and this intermediate; the one or two below it, and as many above, neutral.

17. CTENIUM. Spikelets closely imbricated on one side of the axis of a single curved spike.

* * * Spikelets with one perfect flower below and one or more neutral ones or rudiments above.

18. BOUTELOUA. Lower palea 3-cleft and pointed or 3-awned at the apex. Spikes dense.

19. GYMNOPOGON. Lower palea and the rudiment 1-awned. Spikes filiform, racemed.

20. CYNODON. Flower and the rudiment awnless. Spikes slender, digitate.

* * * * Spikelets several-flowered; more than one of the lower flowers perfect and fertile.

+- Spikes digitate at the summit of the culm, dense.

21. DACTYLOCTENIUM. Glumes compressed-keeled; outer one awned: lower palea pointed.

22. ELEUSINE. Glumes and palea both awnless and blunt.

+- +- Spikes racemed, slender.

23. LEPTOCHLOA. Spikelets loosely spiked. Lower palea pointless or awned at the tip.

Subtribe 4. FESTUCINEÆ. Spikelets several- (few - many-) flowered, panicled; the uppermost flower often imperfect or abortive. Paleæ pointless, or the lower sometimes tipped with a straight (not twisted nor deeply dorsal) awn or bristle. Stigmas projecting from the side of the flower. Stamens 1 - 3.

* Culms herbaceous. Spikelets with the lower flowers all perfect.

+- Grain free from the paleæ. (Also free in one or two species of No. 36.)

++ Joints of the rhachis of the spikelet at the insertion of each flower, or the whole rhachis, bearded. Paleæ convex, not laterally compressed. Glumes and paleæ membranaceous.

24. TRICUSPIS. Spikelets 3 - many-flowered. Lower palea hairy-fringed on the 3 nerves, one or all of which project into awns or mucronate tips, mostly from notches or clefts.

25. DUPONTIA. Spikelets 2 - 3-flowered. Lower palea scarious, entire and awnless.

++ ++ Rhachis of the spikelet and base of the flower not bearded.

¶ Lower palea 1-pointed, awned, or acute, the nerves when present running into the point.

26. DIARRHENA. Glumes (short) and the rigid-pointed lower 3-nerved palea coriaceous, convex-boat-shaped. Stamens 2. Pericarp cartilaginous, large. Panicle loosely few-flowered.

27. DACTYLIS. Glumes (rather long) and lower palea awn-pointed, herbaceous, compressed-keeled. Panicle contracted in one-sided clusters.

28. KŒLERIA. Glumes (nearly as long as the spikelet) and lower palea membranaceous, keeled, acute or mucronate, or rather blunt. Panicle contracted, spike-like

¶ ¶ Lower palea awnless and pointless, blunt (except one Glyceria), the nerves parallel.

a. Glumes extremely dissimilar, 1½ - 3-flowered.

29. EATONIA. Lower glume linear; the upper broadly obovate and folded round the flowers.

b. Glumes alike, but often unequal in size

30. MELICA. Lower palea flattish-convex, many-nerved, membranaceous at the top, hardening on the loose grain. Fertile flowers 1 - 3, the upper enwrapping some deformed sterile flowers

31. GLYCERIA. Lower palea convex or rounded on the back, 5 - 7-nerved, scarious at the tip. Spikelets many-flowered; the flowers commonly deciduous at maturity by the breaking up of the rhachis into joints.

32. BRIZOPYRUM. Lower palea laterally compressed and often keeled, acute, rigid, rather coriaceous, smooth, faintly many-nerved. Spikelets flat, spiked-clustered.

33. POA. Lower palea laterally compressed and mostly keeled, 5-nerved, membranaceous, scarious-margined, the margins or nerves below often cobwebby or pubescent: the upper palea not remaining after the lower falls. Spikelets flattened

34. ERAGROSTIS. Lower palea 3-nerved, keeled, deciduous, leaving the upper persistent on the rhachis. Spikelets flat.

+- +- Grain adherent to the upper palea

35. BRIZA. Lower palea rounded and very obtuse, pointless, many-nerved, flattened parallel to the glumes, becoming ventricose, broadly scarious-margined. Spikelets compressed, somewhat heart-shaped.

36. FESTUCA. Lower palea convex on the back, acute, pointed, or awned at the tip, 5-nerved. Spikelets terete or flattish. Styles terminal.

37. **BROMUS.** Lower palea convex or keeled on the back, mostly awned or bristle-bearing below the 2-cleft tip, 5-9-nerved. Styles subterminal.

* * Culms herbaceous, often tall and reed-like. Lowest flower sterile. Grain free.

38. **UNIOLA.** Spikelets very flat; the one or more lowest flowers neutral, of a single empty palea. Flowers strongly compressed keeled, crowded, coriaceous.

39. **PHRAGMITES.** Spikelets strongly silky-bearded on the rhachis loosely-flowered, the lowest flower staminate or neutral. Paleæ membranaceous.

* * * Culms woody, suffruticose or arborescent.

40. **ARUNDINARIA.** Spikelets flattened, loosely 5-14-flowered: the jointed rhachis naked.

Subtribe 5. HORDEEÆ. Spikelets 1-several-flowered, sessile on opposite sides of a zigzag jointed rhachis (which is excavated or channelled on one side of each joint), forming a spike. Glumes sometimes abortive or wanting. — Otherwise as in the preceding subtribe.

* Spikelets single at each joint of the rhachis, 1-flowered. Spikes often several.

41. **LEPTURUS.** Spikelets almost immersed in the excavations of the slender rhachis.

* * Spikelets single at each joint of the rhachis, several-flowered. Spike solitary.

42. **LOLIUM.** Glume 1, external: spikelets placed edgewise on the rhachis.

43. **TRITICUM.** Glumes 2, transverse (right and left): spikelets placed flatwise on the rhachis.

* * * Spikelets 2 or more at each joint of the rhachis. Spike solitary.

+ Glumes anterior, forming a sort of involucre for the cluster of spikelets.

44. **HORDEUM.** Spikelets 1-flowered, 3 at each joint, but the two lateral usually sterile.

45. **ELYMUS.** Spikelets 1-several-flowered, all perfect and similar.

+ + Glumes none or 1-2 awn-like rudiments.

46. **GYMNOSTICHUM.** Spikelets few-flowered, somewhat pedicelled, 1-3 at each joint.

Subtribe 6. AVENEÆ. Spikelets 2-several-flowered, panicled; the rhachis or base of the flowers often villous-bearded. Glumes mostly equalling or exceeding the flowers. Lower palea bearing a twisted, bent, or straight awn on its back or below its apex (in No. 48 between the teeth); the upper 2-nerved. Stamens 3.

* Flowers all perfect, or the uppermost merely rudimentary.

+ Lower palea truncate or obtuse, its summit mostly denticulate or eroded.

47. **AIRA.** Awn on the back or near the base of the palea, bent or straight.

+ + Lower palea cleft at the apex into 2 acute or sharp-pointed teeth.

++ Awn borne between the sharp or awn-pointed teeth; proceeding from 3 middle nerves.

48. **DANTHONIA.** Lower palea rounded on the back; the awn flat, spirally twisted.

++ ++ Awn below the apex or dorsal, proceeding from the midnerve only.

49. **TRISETUM.** Lower palea compressed-keeled. Awn mostly bent or flexuous.

50. **AVENA.** Lower palea rounded on the back. Awn mostly twisted or bent.

* * One of the flowers staminate only.

51. **ARRHENATHERUM.** Lower flower staminate; the perfect one commonly awnless; the uppermost a rudiment: otherwise as No. 50.

52. **HOLCUS.** Lower flower perfect, awnless; the upper staminate and awned: rudiment none.

TRIBE II. **PHALARIDEÆ,** Trin. (not of Kunth). Spikelets 3-flowered: the *uppermost* or middle (terminal) flower perfect; the two lower (one on each side) imperfect, either staminate, neutral, or reduced to an inconspicuous rudiment.

Subtribe 1. ANTHOXANTHEÆ. Lateral flowers mostly awned, staminate or neutral, of 1 or 2 paleæ; the perfect one awnless and diandrous. Upper palea 1-nerved.

53. **HIEROCHLOA.** Lateral flowers staminate and triandrous, of 2 paleæ.

54. **ANTHOXANTHUM.** Lateral flowers neutral, each of a single awned palea.

Subtribe 2. PHALARIDEÆ Proper. Lateral flowers reduced to a small neutral rudiment on each side of the fertile one; which is awnless and triandrous.

55. **PHALARIS.** Glumes boat-shaped, keeled, enclosing the coriaceous fertile flower, which is somewhat flattened laterally.

TRIBE III. **PANICEÆ.** Spikelets 2-flowered; the lower flower always imperfect, either staminate or neutral; in the latter case usually reduced to a single empty valve (placed next the lower glume, if that be present); the upper (terminal) flower (placed next the upper or inner glume) only fertile. Embryo and groove (when present) on the outer side of the grain! (next the lower valve of the fertile flower). (Flowers polygamous, or hemigamous (when the lower flower is neutral), or sometimes seemingly simple and perfect, from the suppression both of the lower glume and of the upper palea of the neutral flower, sometimes monœcious, or rarely diœcious. Rarely both glumes are wanting.)

Subtribe 1. PASPALEÆ, Griseb. Glumes and sterile paleæ herbaceous or membranaceous: paleæ of the fertile flower of firmer texture, coriaceous or chartaceous, awnless, not keeled, more or less flattened parallel with the glumes.

* Spikelets appearing as if simply 1-flowered from the suppression of the lower glume; the single neutral palea of the sterile flower apparently occupying its place. (Awnless.)

56. **MILIUM.** Spikelets not jointed with their pedicels, all alike in a terminal open panicle.

57. **AMPHICARPUM.** Spikelets jointed with their pedicels, of 2 sorts; one in a terminal panicle; the other subterranean, on radical peduncles.

58. **PASPALUM.** Spikelets jointed with their short pedicels, all alike, plano-convex, in one-sided spikes or spiked racemes.

* * Spikelets manifestly 1½ - 2-flowered (polygamous, the lower flower staminate or often neutral), the lower glume being present.

59. **PANICUM.** Spikelets not involucrate, nor the peduncles bristle-bearing. Lower glume small or minute. Sterile flower either staminate or neutral.

60. **SETARIA.** Spikelets spiked-panicled, the peduncles continued into naked solitary bristles: otherwise as in Panicum.

61. **CENCHRUS.** Spikelets enclosed 1 - 5 together in a hard and spiny globular bur-like involucre.

Subtribe 2. SACCHAREÆ. Fertile paleæ membranaceous or scarious, always of thinner and more delicate texture than the (often indurated) glumes, frequently awned from the tip. Spikelets usually in pairs or threes, panicled or spiked, some of them entirely sterile (heterogamous).

* Spikelets monœcious, imbedded in the separable joints of the spike.

62. **TRIPSACUM.** Staminate spikelets above, in pairs at each joint: pistillate single in each joint: glumes indurated.

* * Fertile spikelets with one perfect and one sterile (staminate or mostly neutral) flower: lower palea of the perfect flower awned.

63. **ERIANTHUS.** Both spikelets at each joint of the rhachis alike fertile, involucrate with a silky tuft: otherwise as No. 64.

64. **ANDROPOGON.** Spikelets 2 at each joint of the plumose-hairy spikes, one of them sessile and fertile; the other pedicelled and sterile or rudimentary.

65. **SORGHUM.** Spikelets in open panicles, 2 - 3 together, the lateral ones sterile or sometimes reduced to mere pedicels.

1. LEÉRSIA, Solander. FALSE RICE. WHITE GRASS.

Spikelets 1-flowered, perfect, flat, crowded in one-sided panicled spikes or racemes, more or less imbricated over each other, jointed with the short pedicels. Glumes wanting. Paleæ chartaceous, much flattened laterally, boat-shaped, awnless, bristly-ciliate on the keels, closed, nearly equal in length, but the lower much broader, enclosing the flat grain. Stamens 1 - 6. Stigmas feathery, the hairs branching. — Perennial marsh grasses: the flat leaves, sheaths, &c., rough upwards (especially in No. 1), being clothed with very minute hooked prickles. (Named after *Leers*, a German botanist.)

* *Spikelets narrowly oblong, rather loosely crowded.*

1. **L. oryzoìdes,** Swartz. (Rice Cut-grass.) *Panicle diffusely branched,* often sheathed at the base; *spikelets flat, rather spreading* in flower (2½''–3'' long); *stamens* 3; paleæ strongly bristly-ciliate (whitish). -- Wet places; common. (Eu.)

2. **L. Virgínica,** Willd. (White Grass.) *Panicle simple; the spikelets closely appressed* on the slender branches around which they are partly curved (1½'' long); stamens 2 (a third imperfect or wanting); paleæ sparingly ciliate (greenish-white). — Wet woods. Aug., Sept.

* * *Spikelets broadly oval, imbricately covering each other* (2½''–3'' *long*).

3. **L. lenticulàris,** Michx. (Fly-catch Grass.) Smoothish; panicle simple; paleæ very flat, strongly bristly ciliate (said to close and catch flies); stamens 2. — Low grounds, Virginia, Illinois, and southward.

Orỳza satìva, the Rice-plant, is allied to this genus.

2. ZIZÀNIA, Gronov. Water or Indian Rice.

Flowers monœcious; the staminate and pistillate both in 1-flowered spikelets in the same panicle. Glumes wanting, or rudimentary, and forming a little cup. Paleæ herbaceo-membranaceous, convex, awnless in the sterile spikelets, the lower tipped with a straight awn in the fertile ones. Stamens 6. Stigmas pencil-form. — Large and often reed-like water-grasses. Spikelets jointed with the club-shaped pedicels, very deciduous. (Adopted from Ζιζάνιον, the ancient name of some wild grain.)

1. **Z. aquática,** L. (Indian Rice. Water Oats.) *Lower branches of the* ample pyramidal *panicle staminate, spreading; the upper erect, pistillate;* pedicels strongly club-shaped; *lower paleæ long-awned,* rough; styles distinct; grain linear, slender. ① (Z. clavulosa, *Michx.*) — Swampy borders of streams and in shallow water; common, especially northwestward. Aug. — Culms 3°–9° high. Leaves flat, 2°–3° long, linear-lanceolate. Grain ½' long; gathered for food by the Northwestern Indians.

2. **Z. miliàcea,** Michx. Panicle diffuse, ample, the *staminate and pistillate flowers intermixed; awns short;* styles united; grain ovate. ♃ — Penn.? Ohio, and southward. Aug. — Leaves involute.

3. ALOPECÙRUS, L. Foxtail Grass.

Spikelets 1-flowered. Glumes boat-shaped, strongly compressed and keeled, nearly equal, united at the base, equalling or exceeding the lower palea, which is awned on the back below the middle: upper palea wanting! Stamens 3. Styles mostly united. Stigmas long and feathered. — Panicle contracted into a cylindrical and soft dense spike. (Name from ἀλώπηξ, *fox*, and οὐρά, tail, the popular appellation, from the shape of the spike.)

1. **A. praténsis,** L. (Meadow Foxtail.) Culm upright, smooth (2° high); *palea equalling the acute glumes; awn exserted more than half its length, twisted;* upper leaf much shorter than its inflated sheath. ♃ — Meadows and pastures of E. New England and New York. May. (Nat. from Eu.)

2. **A. geniculàtus**, L. (Floating Foxtail.) Culm ascending, bent at the lower joints; *palea rather shorter than the obtuse glumes, the awn from near its base and projecting half its length beyond it;* anthers linear; upper leaf as long as its sheath. ♃ — Moist meadows: rare. July, Aug. (Nat. from Eu.)

3. **A. aristulàtus**, Michx. (Wild Water-Foxtail.) *Glaucous;* culm decumbent below, at length bent and ascending; *palea rather longer than the obtuse glumes, scarcely exceeded by the awn* which rises from just below its middle; anthers oblong. ♃ (A. subaristatus, *Pers.*) — In water and wet meadows; common, especially northward. June - August. Spike more slender and paler than in the last. (Eu.)

4. PHLÈUM, L. Cat's-tail Grass.

Paleæ both present, shorter than the mucronate or awned glumes; the lower one truncate, usually awnless. Styles distinct. Otherwise much as in Alopecurus. — Spike very dense, harsh. (An ancient Greek name, probably of the Cat-tail.)

1. **P. praténse**, L. (Timothy. Herd's-Grass in New England and New York.) *Spike cylindrical,* elongated; glumes ciliate on the back, tipped with a *bristle less than half their length.* ♃ — Meadows, &c.; very valuable for hay. (Nat. from Eu.)

2. **P. alpìnum**, L. *Spike ovate-oblong;* glumes strongly ciliate-fringed on the back, tipped with a rough *awn-like bristle about their own length.* ♃ — Alpine tops of the White Mountains, New Hampshire, and high northward. (Eu.)

5. VÍLFA, Adans., Beauv. Rush-Grass.

Spikelets 1-flowered, in a contracted or spiked panicle. Glumes 1-nerved or nerveless, not awned or pointed, the lower smaller. Flower nearly sessile in the glumes. Paleæ 2, much alike, of the same texture as the glumes (membranaceo-chartaceous) and usually longer than they, naked, neither awned nor mucronate; the lower 1-nerved (rarely somewhat 3-nerved). Stamens chiefly 3. Stigmas simply feathery. Grain (caryopsis) oblong or cylindrical, deciduous. — Culms wiry or rigid. Leaves involute, usually bearded at the throat; their sheaths often enclosing the lateral panicle. (Name unexplained.)

1. **V. áspera**, Beauv. *Root perennial;* culms tufted (2° - 4° high); lowest leaves very long, rigid, rough on the edges, tapering to a long involute and thread-like point; the upper short, involute; sheaths partly enclosing the contracted panicle; *paleæ much longer than the unequal glumes;* grain oval or oblong. (Agrostis aspera, *Michx.* A. clandestina & A. involuta, *Muhl.* A. longifolia, *Torr.*) — Sandy fields and dry hills; not rare, especially southward. Sept. — Spikelets 2″ - 3″ long. Paleæ rough above, smooth or hairy below, of greatly varying proportions; the upper one tapering upwards, acute, and one half to twice longer than the lower, or else obtuse and equalled, or even considerably exceeded, by the lower!

2. **V. vaginæflòra**, Torr. *Root annual;* culms slender (6′ - 12′ high), ascending; leaves involute-awl-shaped (1′ - 4′ long); panicles simple and spiked,

4. **A. canìna**, L. (Brown Bent-Grass.) Culms slender (1°–2° high); root-leaves involute-bristle-form, those of the culm flat and broader, linear; branches of the short and loose erect-spreading panicle slender, branching above the middle; *lower palea* a little shorter than the almost equal glumes, *bearing a long* (at length bent or somewhat twisted) *awn on the back a little below the middle*, the upper one minute and inconspicuous (only half the length of the ovary); spikelets greenish, turning brown or purplish, about 1‴ long. ♃ — Meadows, &c., E. New England: scarce. (Nat. from Eu.)

Var. **alpìna**, Oakes (var.? tenella, *Torr.*; A. rubra, *L., ed.* 1.; A. Pickeringii & A. concinna, *Tuckerm.*), is a lower, often contracted mountain form, with spikelets 1½‴ long. Mountain-tops, Maine to New York. July, Aug. (Eu.)

§ 2. AGROSTIS Proper. — *Upper palea manifest, but shorter than the lower.*

5. **A. vulgàris**, With. (Red-top. Herd's-Grass of Penn., &c.) Rootstocks creeping; culm mostly upright (1°–2° high); *panicle oblong*, with spreading slightly rough short branches (*purple*); leaves linear; *ligule very short*, truncate; lower palea nearly equalling the glumes, chiefly awnless, 3-nerved; the upper about one half its length. ♃ (A. polymorpha, *Huds.* partly.) — Varies with a rougher panicle (A. hispida, *Willd.*), and rarely with the flower awned (A. pumila, *L.*) — Low meadows; naturalized from Eu. Also native in Northern New York and northward. (Eu.)

6. **A. álba**, L. (White Bent-Grass.) Culm ascending, rooting at the lower joints (1°–2° high); *panicle narrow*, contracted after flowering (*greenish-white or barely tinged with purple*), the branches rough; *ligule oblong or linear*; lower palea rather shorter than the glumes, 5-nerved, awnless, or rarely short-awned on the back; otherwise as in the last. ♃ — Varies with the panicle more contracted (A. stolonífera, L., *Fiorin Grass*); and var. aristàta, with the lower *palea long-awned* from near its base. (A. stricta, *Willd.*) — Moist meadows and fields. A valuable grass, like the foregoing. (Nat. from Eu.)

8. POLYPÒGON, Desf. Beard-Grass.

Spikelets 1-flowered, in a contracted somewhat spike-like panicle. Glumes nearly equal, long-awned, much longer than the membranaceous paleæ, the lower of which is commonly short-awned below the apex. Stamens 3. Grain free. (Name composed of πολύ, *much*, and πώγων, *beard*; from the awns.)

1. **P. Monspeliénsis**, Desf. Panicle interrupted; glumes oblong, the awn from a shallow notch at the summit; lower palea awned. ① — On the coast, Isle of Shoals, New Hampshire (*Oakes & Robbins*), Virginia? and southward. (Nat. from Eu.)

9. CÍNNA, L. Wood Reed-Grass.

Spikelets 1-flowered, much flattened, crowded in an open flaccid panicle. Glumes lanceolate, acute, strongly keeled, hispid-serrulate on the keel; the lower rather smaller, the upper a little exceeding the paleæ. Flower manifestly stalked in the glumes, smooth and naked; the paleæ much like the glumes; the lower longer than the upper, short-awned or bristle-pointed on the back below the pointless apex. Stamen one, opposite the 1-nerved upper palea! Grain linear-oblong, free. — A perennial, rather sweet-scented grass, with simple and upright somewhat reed-like culms (2° – 7° high), bearing a large compound terminal panicle, its branches in fours or fives, broadly linear-lanceolate flat leaves (¼′ – ½′ wide), and conspicuous ligules. Spikelets green, often purplish-tinged. (Name unexplained.)

1. **C. arundinàcea,** L. — Moist woods and shaded swamps; rather common, both northward and southward. July, Aug. — Panicle 6′ – 15′ long, rather dense; the branches and pedicels spreading in flower, afterwards erect. Spikelets 2½″ – 3″ long. Awn of the palea either obsolete or exserted.

Var. **péndula.** Panicle loose and more slender, the branches nearly capillary and drooping in flower; pedicels very rough; glumes and paleæ more membranaceous, the former less unequal; spikelets 1½″ – 2″ long; upper palea obtuse. (C. pendula, *Trin.* C. latifolia, *Griseb.* C. expansa, *Link.* Blyttia suavèolens, *Fries.*) — Deep damp woods, N. New York to Lake Superior and northward, and on mountains southward. — A northern, more delicate state of the last, as is shown by intermediate specimens. (Upper palea as long as the lower, but shorter, as figured in *Anders. Gram. Scand.*, only not with 3 stamens, but *monandrous*, both in American specimens and in Norwegian, given in *Fries, Herb. Norm.*) (Eu.)

10. MUHLENBÉRGIA, Schreber. DROP-SEED GRASS.

Spikelets 1-flowered, in contracted or rarely open panicles. Glumes mostly acute or bristle-pointed, persistent; the lower rather smaller or minute. Flower very short-stalked or sessile in the glumes; the paleæ usually hairy-bearded at the base, herbaceous, deciduous with the enclosed grain, often equal; the lower 3-nerved, mucronate or awned at the apex. Stamens 3. (Dedicated to the *Rev. Dr. Muhlenberg*, a distinguished American botanist.)

§ 1. MUHLENBERGIA PROPER. — *Panicles contracted or glomerate, terminal and axillary: perennials (in our species) with branching rigid culms, from scaly creeping rootstocks: leaves short and narrow.*

* *Lower palea barely mucronate or sharp-pointed.* (Sp. of Cinna, *Kunth, Trin.*)

1. **M. sobolífera.** Culms ascending (1° – 2° high), sparingly branched; the *simple contracted panicle very slender* or filiform; *glumes barely pointed, almost equal, ⅓ shorter than the equal paleæ;* lower palea abruptly short-mucronate. (Agrostis sobolifera, *Muhl.*) — Open rocky woods, Vermont to Michigan, Illinois, and southward. Aug. — Spikelets less than 1″ long.

2. **M. glomeràta,** Trin. Culms upright (1° – 2° high), sparingly branched or simple; *panicle oblong-linear, contracted into an interrupted glomerate spike,* long-peduncled, the branches sessile; *glumes awned,* nearly equal, and (with the bristle-like awn) about twice the length of the unequal very acute paleæ. (Agr. racemosa, *Michx.* A. setosa, *Muhl.* Polypogon racemosus, *Nutt.*) — Bogs, &c.; common, especially northward. Aug. — Panicle 2′ – 3′ long.

3. **M. Mexicàna,** Trin. Culms ascending, much branched (2° – 3° high); *panicles* lateral and terminal, often included at the base, *contracted, the*

branches densely spiked-clustered, linear (green and purplish); *glumes awnless, sharp pointed*, unequal, the upper about the length of the very acute lower palea. (Agr. Mexicana, *L.* A. lateriflora, *Michx.*) — Varies with more slender panicles (A. filiformis, *Muhl.*) — Low grounds; common. Aug.

* * *Lower palea bristle-awned from the tip: flowers short-pedicelled.*

4. **M. sylvática,** Torr. & Gr. Culms ascending, much branched and diffusely spreading (2° - 4° long); contracted *panicles densely many-flowered; glumes almost equal, bristle-pointed, nearly as long as the lower palea*, which bears an awn twice or thrice the length of the spikelet. (Agr. diffusa, *Muhl.*) — Low or rocky woods; rather common. Aug., Sept. — Aspect between No. 3 and No. 5.

5. **M. Willdenòvii,** Trin. Culms upright (3° high), slender, simple or sparingly branched; contracted *panicle slender, loosely flowered; glumes slightly unequal, short-pointed, half the length of the lower palea*, which bears an awn 3 - 4 times the length of the spikelet. (Agr. tenuiflora, *Willd.*) — Rocky woods; rather common. Aug.

6. **M. diffùsa,** Schreber. (DROP-SEED. NIMBLE WILL.) Culms diffusely much branched (8′ - 18′ high); contracted *panicles slender*, rather loosely many-flowered, terminal and lateral; *glumes extremely minute, the lower obsolete*, the upper truncate; awn once or twice longer than the palea. (Dilepyrum minutiflorum, *Michx.*) — Dry hills and woods, from S. New England to Michigan, Illinois, and southward. Aug., Sept. — Spikelets much smaller than in the foregoing, 1″ long.

§ 2. TRICHÓCHLOA, DC. — *Panicle very loose and open, the long branches and pedicels capillary: leaves narrow, often convolute-bristle-form.*

7. **M. capillàris,** Kunth. (HAIR-GRASS.) Culm simple, upright (2° high) from a fibrous (perennial?) root; panicle capillary, expanding (6′ - 20′ long, purple); glumes unequal, ¼ to ½ the length of the long-awned paleæ, the lower mostly pointless, the upper more or less bristle-pointed. — Sandy soil, W. New England to New Jersey, Kentucky, and southward. Aug. — Pedicels 1′ - 2′ long, scarcely thicker than the awns, which are about 1′ long.

11. BRACHYÉLYTRUM, Beauv. BRACHYELYTRUM.

Spikelets 1-flowered, with a conspicuous filiform pedicel of an abortive second flower about half its length, nearly terete, few, in a simple appressed racemed panicle. Lower glume obsolete; the upper minute, pointless, persistent, shorter than the width of the thick stalk of the flower. Paleæ chartaceo-herbaceous, involute, enclosing the linear-oblong grain, somewhat equal, rough with scattered short bristles; the lower 5-nerved, contracted at the apex into a long straight awn; the upper 2-pointed; the awn-like sterile pedicel partly lodged in the groove on its back. Stamens 2: anthers and stigmas very long. — A perennial grass, with simple culms (1° - 3° high) from creeping rootstocks, downy sheaths, broad and flat lanceolate pointed leaves, and large spikelets ½′ long without the awn. (Name composed of βραχύς, *short*, and ἔλυτρον, *husk*, from the very short glumes.)

1. **B. aristàtum,** Beauv. (Muhlenbergia erecta, *Schreb.* Dilepyrum aristosum, *Michx.*) — Rocky woods; rather common. June.

12. CALAMAGRÓSTIS, Adans. REED BENT-GRASS.

Spikelets 1-flowered, and often with a pedicel or rudiment of a second abortive flower, in an open or spiked panicle. Glumes keeled or boat-shaped, often acute, commonly nearly equal, and exceeding the flower, which is surrounded at the base by a copious tuft of white bristly hairs. Paleæ membranaceous, or in the second and third sections of a firmer texture; the lower bearing a slender awn on the back or below the tip, rarely awnless; the upper mostly shorter. Stamens 3. Grain free. — Perennials, with running rootstocks, and mostly tall and simple rigid culms. (Name compounded of κάλαμος, *a reed*, and ἀγρόστις, *a grass*.)

§ 1. CALAMAGROSTIS PROPER. — *Flower, &c. much as in* Agrostis, *except the hairy tuft: the boat-shaped glumes and the paleæ membranaceous; the former equal or the lower one rather longer: lower palea 3 - 5-nerved, awned on the back: panicle open.* (*All the following have a rudimentary plumose pedicel of a second flower.*)

* *Glumes open or loose after flowering.*

1. **C. Canadénsis,** Beauv. (BLUE JOINT-GRASS.) Panicle oblong, loose (often purplish); *lower palea* nearly as long as the lanceolate acute glumes, *not exceeding the very fine hairs, bearing an extremely delicate awn below the middle* scarcely equalling or exceeding the hairs; rudimentary pedicel minute. (Arundo Canadensis, *Michx.* C. Mexicana, *Nutt.*) — Wet grounds; common northward, and southward along the Alleghanies. July. — Rather glaucous, 3° - 5° high: leaves flat. Glumes rough, 1½″ long.

* * *Glumes closed in fruit.*

2. **C. confínis,** Nutt. Panicle elongated, narrow (5′ - 8′ long), the branches appressed after flowering, pale; *lower palea nearly equalling the oblong-lanceolate acute glumes, ⅓ longer than the hairs* (excepting those of the conspicuous rudiment), *bearing between the middle and the base a rather stout and slightly exserted awn.* (Ar. confinis, *Willd.!* C. inexpansa, *Gray.*) — Swamps, N. and W. New York (especially Penn Yan, *Sartwell*) and Pennsylvania. July. — Spikelets rather larger than in the last; upper glume more or less shorter.

3. **C. coarctàta,** Torr. Panicle contracted, dense (3′ - 6′ long); *lower palea shorter than the taper-pointed tips of the lanceolate glumes, almost twice the length of the hairs* (excepting the strong tuft borne by the conspicuous rudiment), bearing a rigid and exserted short *awn above the middle.* (C. Canadensis, *Nutt.*) — Wet grounds, Mass. to Wisconsin? and (chiefly) southward. Aug. — Culm 3° - 5° high. Glumes 4″ long. Grain hairy, crowned with a bearded tuft.

4. **C. Pickeríngii.** Panicle dense and narrow (3′ - 5′ long, purplish); paleæ nearly equal, rather shorter than the *ovate-oblong merely acute glumes; awn inserted between the middle and the base, stout,* often a little bent, not exceeding the glumes; *hairs very short and scanty,* ⅓ the length of the paleæ, half as long as the small plumose rudiment. — Alpine region of the White Mountains of New Hampshire; first collected by *Dr. Pickering* and *Mr. Oakes.* Sept. — Culm 1° high. Spikelets smaller and glumes less pointed than in C. sylvatica, *DC.*, to which belongs C. purpurascens, *R. Br.?* Leaves short and flat.

§ 2. CALAMOVÍLFA. — *Glumes and equal paleæ rather chartaceous, compressed-keeled; the lower glume shorter than the upper and shorter than the paleæ, of which the lower is 1-nerved and entirely awnless; the upper strongly 2-keeled: rudiment wanting: panicle open and loose.*

5. **C. brevipilis.** Branches of the diffuse pyramidal panicle capillary (purplish); *glumes ovate,* mucronate; the upper slightly, the lower nearly one half, shorter than the *paleæ,* which are *above twice the length of the hairs and bristly-bearded along the keels.* (Arundo brevipilis, *Torr.*) — Sandy swamps, pine barrens of New Jersey; rare. Sept. — Culm slender, 3° – 4° high: leaves nearly flat.

6. **C. longifòlia,** Hook. Culm (1° – 4° high) stout, from thick running rootstocks; *leaves rigid, elongated, involute* above and tapering into a long thread-like point; branches of the pyramidal panicle smooth; *glumes lanceolate,* the upper as long as the similar paleæ, the lower ¼ shorter; the *copious hairs more than half the length of the naked paleæ.* — Sandy coast of N. Michigan, and northwestward. Spikelets ⅓′ long. Sheaths clothed with deciduous wool.

§ 3. AMMÓPHILA, Host. — *Glumes nearly equal and rather longer than the equal similar paleæ, scarious-chartaceous, lanceolate, compressed-keeled: lower palea 5-nerved, slightly mucronate or obscurely awned near the tip; the upper 2-keeled: rudiment present and plumose above: squamulæ lanceolate, much longer than the ovary: panicle spiked-contracted: spikelets large (½′ long).*

7. **C. arenària,** Roth. (SEA SAND-REED.) Culm rigid (2° – 3° high) from stout running rootstocks; leaves long, soon involute; panicle contracted into a dense cylindrical spike (5′ – 9 long); hairs only ⅓ the length of the paleæ. (Arundo, *L.* Psamma, *Beauv.*) — Sandy beaches, New Jersey to Maine, and northward; also Lakes Michigan and Superior. Aug. (Eu.)

18. ORYZÓPSIS, Michx. MOUNTAIN RICE.

Spikelets 1-flowered nearly terete. Glumes herbaceo-membranaceous, several-nerved, nearly equal, commonly rather longer than the oblong flower, which is deciduous at maturity, and with a very short obtuse callus. Lower palea coriaceous, at length involute so as closely to enclose the upper (of the same length) and the oblong grain; a simple untwisted and deciduous awn jointed on its apex. Stamens 3. Squamulæ 2 or 3, conspicuous. Styles sometimes united: stigmas plumose. — Perennials, with rigid leaves and a narrow raceme or panicle. Spikelets greenish, rather large. (Name composed of ὄρυζα, *rice,* and ὄψις, *likeness,* from a fancied resemblance to that grain.)

* * *Styles distinct, short: culm leafy to the summit: callus glabrous.*

1. **O. melanocárpa,** Muhl. Leaves lanceolate, taper-pointed, flat; sheaths bearded in the throat; panicle simple or sparingly branched, the branches divergent; spikelets loosely racemed; *awn thrice the length of the blackish palea* (nearly 1′ long). (Milium racemosum, *Smith.* Piptathèrum nigrum, *Torr.*) — Rocky woods; not rare. Aug. — Culm 2° – 3° high.

* * *Styles united below, slender: culms tufted, naked above: callus bearded.*

2. **O. asperifòlia,** Michx. Culms (9′ – 18′ high) clothed with sheaths bearing a mere rudimentary blade, overtopped by the *long and rigid linear leaf*

from the base; panicle very simple and raceme-like, few-flowered; *awn 2-3 times the length of the rather hairy whitish paleæ.* (Urachne, *Trin:*) — Hill-sides, &c., in rich woods; common northward. May. — Leaves concave, keelless, rough-edged, pale underneath, lasting through the winter. Squamulæ lanceolate, almost as long as the inner palea!

3. **O. Canadénsis,** Torr. Culms slender (6′-15′ high), the lowest sheaths leaf-bearing; *leaves involute-thread-shaped;* panicle contracted (1′-2′ long), the branches usually in pairs; paleæ pubescent, whitish; *awn short and very deciduous, or wanting.* (O. parviflora, *Nutt.* Stipa juncea, *Michx.* S. Canadensis, *Poir.* Milium pungens, *Torr.* Urachne brevicaudata, *Trin.*) — Rocky hills and dry plains, W. New England to Wisconsin, and northward; rare. May. — Glumes 1″-2″ long, sometimes purplish. — Through the species, or perhaps variety, Urachne micrantha, *Trin.*, this genus is strictly connected with Stipa.

14. STÌPA, L. Feather-Grass.

Spikelets 1-flowered, terete: the flower falling away at maturity, with the conspicuous obconical bearded and often sharp-pointed stalk (callus), from the membranaceous glumes. Lower palea coriaceous, cylindrical-involute, closely embracing the smaller upper one and the cylindrical grain, having a long and twisted or tortuous simple awn jointed with its apex (naked in our species). Stamens mostly 3. Stigmas plumose. — Perennials, with narrow involute leaves and a loose panicle. (Name from στύπη, *tow,* in allusion to the flaxen appearance of the feathery awns of the original species.)

* *Callus or base of the flower short and blunt; glumes pointless.*

1. **S. Richardsònii,** Link. Culm (1½°-2° high) and leaves slender; panicle loose (4′-5′ long), with slender few-flowered branches; glumes nearly equal, oblong, acutish (2½″ long), about equalling the pubescent linear-oblong lower palea, which bears a tortuous or geniculate awn 6″-8″ long. — Pleasant Mountain, near Sebago Lake, Maine, *C. J. Sprague;* and northwestward. (Flowers rather smaller than in Richardson's plant, as described by Trinius and Ruprecht.)

* * *Callus or base of the flower pungently pointed: at maturity villous-bearded: lower palea slender and minutely bearded at the tip: glumes taper-pointed.*

2. **S. avenàcea,** L. (Black Oat-Grass.) Culm slender (1°-2° high); leaves almost bristle-form; *panicle open; paleæ blackish, nearly as long as the almost equal glumes* (about 4″ long), the awn bent above, twisted below (2′-3′ long). — Dry or sandy woods, S. New England to Wisconsin, and (chiefly) southward. July.

3. **S. spártea,** Trin., not of Hook. (Porcupine Grass.) Culm rather stout (1½°-3° high); *panicle contracted; paleæ linear,* ¾′-1′ long (including the long callus), pubescent below, *shorter than the* lanceolate slender subulate-pointed greenish *glumes;* the twisted strong awn 3½′-7′ long, pubescent below, rough above. (S. juncea, *Pursh?*) — Plains and prairies, from Illinois and N. Michigan northwestward.

§ 2. CALAMOVÍLFA. — *Glumes and equal paleæ rather chartaceous, compressed-keeled; the lower glume shorter than the upper and shorter than the paleæ, of which the lower is 1-nerved and entirely awnless; the upper strongly 2-keeled: rudiment wanting: panicle open and loose.*

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* *Callus or base of the flower short and blunt; glumes pointless.*

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3. **S. spártea,** Trin., not of Hook. (PORCUPINE GRASS.) Culm rather stout (1½°-3° high); *panicle contracted; paleæ linear,* ¾′-1′ long (including the long callus), pubescent below, *shorter than the* lanceolate slender subulate-pointed greenish *glumes;* the twisted strong awn 3½′-7′ long, pubescent below, rough above. (S. juncea, *Pursh?*) — Plains and prairies, from Illinois and N. Michigan northwestward.

15. ARÍSTIDA, L. TRIPLE-AWNED GRASS.

Glumes unequal, often bristle-pointed. Lower palea tipped with three awns; the upper palea much smaller. Otherwise much as in Stipa. — Culms branching: leaves narrow, often involute. Spikelets in simple or panicled racemes or spikes. (Name from *arista*, a beard or awn.) All grow in sterile, dry soil, and all ours have the awns naked and persistent, and flower towards the end of summer.

* *Awns separate to the base, not jointed with the palea.*

+ *Awns very unequal; the 2 lateral merely short erect bristles, scarcely ⅓ or ¼ the length of the horizontal at length recurved middle one: root annual: culms tufted, much branched throughout, low* (5'–18' *high*): *racemes short and spike-like.*

1. **A. dichótoma,** Michx. (POVERTY GRASS.) *Culms erect* or ascending; spikelets small, mostly crowded and panicled; *glumes* 1-*nerved*, ¼'–⅓ long, exceeding the flower, which bears a middle *awn of about its own length.* — Common in old fields, &c., especially southward.

2. **A. ramosissima,** Engelm. mss. *Culms diffuse;* spiked raceme simple and loosely flowered; *glumes* ⅝'–¾' long, 3–5-*nerved*, about equalling the flower, the soon recurved middle awn 1' long. — Dry prairies of Illinois (*Engelmann*), and Kentucky (*herb. Michaux*). — Glumes short-awned; the lower 4–5-nerved; the inner and longer one 3-nerved, 2-cleft at the tip. Lateral awns of the palea only 1½''–2'' long. Ligule truncate, bearded.

+ + *Awns unequal but similar; the 2 lateral about half the length of the horizontally bent middle one: root annual: culms branched only towards the base, naked above, bearing a long and slender spiked raceme or virgate panicle.*

3. **A. grácilis,** Ell. Culms slender, erect (6'–18' high); flower as long as the glumes (2½''–,3'' long); *lateral awns as long as the palea*, the middle one ⅓'–⅔' long. — Sand, E. Massachusetts and New Jersey to Illinois, and southward.

+ + + *Awns nearly equal, divergently spreading: root perennial.*

++ *Culms simple or nearly so* (1°–2° *high*), *terminated by a long and strict virgate many-flowered spiked panicle from* 6' *to* 18' *in length.*

4. **A. strícta,** Michx. *Leaves* soon involute-filiform, *rigid, downy or glabrous; lower palea smooth*, 3''–4'' long, the equally spreading awns ½' long, or the lateral rather shorter. — Virginia and southward.

5. **A. purpuráscens,** Poir. *Leaves glabrous*, less rigid; *lower palea rough* or minutely serrulate-hispid on the keel and the slender lateral nerves, 4''–5'' long; the divaricate middle awn 1' long, the lateral a little shorter and at first erect. (A. racemosa, *Muhl.* A. Geyeriana, *Steud.*) — Massachusetts to Michigan, Illinois, and southward; common.

++ ++ *Culms branching below* (1°–1½° *high*), *the branches naked above and racemosely or paniculately several-* (4–12-) *flowered.*

6. **A. oligántha,** Michx. Spikelets large, very short-pedicelled; glumes equalling the flower, 8''–10'' long, the lower 3–5-nerved and 2-cleft at the tip, the upper 1-nerved and more awned at the tip; awns of the palea 1½'–3' long,

divaricate, the lateral a little shorter than the middle one. — Virginia to Illinois, and southwestward. — Resembles small forms of the next.

* * *Awns united below into one, jointed with the apex of the palea: root annual.*

7. **A. tuberculòsa,** Nutt. Culm branched below (6′–18′ high), tumid at the joints; panicles rigid, loose; the branches in pairs, one of them short and about 2-flowered, the other elongated and several-flowered; glumes (1′ long, including their slender-awned tips) longer than the palea; which is tipped with the common stalk (about its own length) of the 3 equal divergently-bent awns (1½′–2′ long) twisting together at the base. — Sandy soil, E. Massachusetts to New Jersey; also Wisconsin, Illinois, and southward.

16. SPARTÌNA, Schreber. CORD or MARSH GRASS.

Spikelets 1-flowered, without a rudiment, very much flattened laterally, spiked in 2 ranks on the outer side of a triangular rhachis. Glumes strongly compressed-keeled, acute, or bristle-pointed, mostly rough-bristly on the keel; the upper one much larger and exceeding the pointless and awnless paleæ, of which the upper is longest. Squamulæ none. Stamens 3. Styles long, more or less united. — Perennials, with simple and rigid reed-like culms, from extensively creeping scaly rootstocks, racemed spikes, very smooth sheaths, and long and tough leaves (whence the name, from *σπαρτίνη, a cord,* such as was made from the bark of the *Spartium,* or Broom).

* *Spikelets compactly imbricated, rough-hispid on the keels: spikes more or less peduncled: culm and leaves rigid.*

1. **S. cynosuroìdes,** Willd. (FRESH-WATER CORD-GRASS.) *Culm rather slender* (2°–4° high); *leaves narrow* (2°–4° long, ½′ or less wide below), tapering to a very slender point, keeled, flat, but quickly involute in drying, smooth except the margins; *spikes* 5–14, scattered, spreading; rhachis rough on the margins; *glumes awn-pointed,* especially the upper, *the lower equalling the lower palea,* whose strong rough-hispid midrib abruptly terminates below the membranous apex. (Trachynotia cynosuroides, *Michx.* Limnetis, *Pers.*) — Banks of rivers and lakes through the interior, chiefly northward. Aug. — Spikes 2′–3′ long, straw-color. Glumes strongly serrulate-hispid on the keel; the awn of the upper one about ¼′ long. Paleæ somewhat unequal. — Certainly distinct from the next, to which, in strictness, the Linnæan name belongs.

2. **S. polystàchya,** Willd., Muhl. (SALT REED-GRASS.) *Culm tall and stout* (4°–9° high, often 1′ in diameter near the base); *leaves broad* (½′ to 1′), *roughish underneath,* as well as the margins; *spikes* 20–50, *forming a dense oblong raceme* (purplish); *glumes barely mucronate, the lower half the length of the equal paleæ,* of which the rough-hispid midrib of the lower one reaches to the apex. (Trachynotia polystachya, *Michx.* Dactylis cynosuroides, *L.!* in part, excl. var.) — Salt or brackish marshes, within tide-water, especially southward.

3. **S. júncea,** Willd. (RUSH SALT-GRASS.) *Culms low* (1°–2° high) *and slender; leaves narrow and rush-like, strongly involute, very smooth; spikes* 1–5, on very short peduncles; the rhachis smooth; *glumes acute,* the lower scarcely ½ the length of the upper, not half the length of the lower palea. (Dactylis pa-

tens, *Ait.*) — Salt marshes, and sandy sea-beaches, common. August. (Also in one locality in S. of Eu.)

* * *Spikelets loosely imbricated, or somewhat remote and alternate, the keels slightly hairy or roughish under a lens: spikes sessile and erect, soft; leaves, rhachis, &c. very smooth: culm, &c. rather succulent.*

4. **S. stricta,** Roth. (SALT MARSH-GRASS.) Culm 1° – 3° high, leafy to the top; leaves convolute, narrow; spikes few (2 – 4), the rhachis slightly projecting at the summit beyond the crowded or imbricated spikelets; glumes acute, very unequal, the larger 1-nerved, a little longer than the paleæ. — Salt marshes, Pennsylvania, &c. (*Muhl.*) (Eu.)

Var. **glàbra,** Muhl. (S. glabra, *Muhl.*, partly.) Culm and leaves mostly longer; spikes 5 – 12 (2′ – 3′ long), the spikelets imbricate-crowded. — Common on the coast.

Var. **alterniflòra.** (S. alterniflora, *Loisel.* Dactylis cynosuroïdes, var., *L.*) Spikes more slender (3′ – 5′ long), and the spikelets remotish, barely overlapping, the rhachis continued into a more conspicuous bract-like appendage; larger glume indistinctly 5-nerved (not so evidently as in the Eu. and Trop. Amer. plant): otherwise as in the preceding form, into which it passes. — Common with the last. — Odor strong and rancid.

17. CTÉNIUM, Panzer. TOOTHACHE-GRASS.

Spikelets densely imbricated in two rows on one side of a flat arcuate-curved rhachis, forming a solitary terminal spike. Glumes persistent; the lower one (interior) much smaller; the other concave below, bearing a stout recurved awn, like a horn, on the middle of the back. Flowers 4 – 6, all but one neutral; the one or two lower consisting of empty awned paleæ, the one or two uppermost of empty awnless paleæ: the perfect flower intermediate in position; its paleæ membranaceous, the lower awned or mucronate below the apex and densely ciliate towards the base, 3-nerved. Squamulæ 2. Stamens 3. Stigmas plumose. (Name Κτενίον, *a small comb*, from the pectinate appearance of the spike.)

1. **C. Americànum,** Spreng. Culm (3° – 4° high) simple, pubescent or roughish; larger glume warty-glandular outside and conspicuously awned. ♃ (Monócera aromatica, *Ell.*) — Wet pine barrens, S. Virginia and southward. — Taste very pungent.

18. BOUTELOÙA, Lagasca (1805). MUSKÍT-GRASS.

Spikelets crowded and closely sessile in 2 rows on one side of a flattened rhachis, comprising one perfect flower below and one or more sterile (mostly neutral) or rudimentary flowers. Glumes concave-keeled, the lower one shorter. Perfect flower with the 3-nerved lower palea 3-toothed or cleft at the apex, the 2-nerved upper palea 2-toothed, the teeth, at least of the former, pointed or subulate-awned. Stamens 3: anthers orange-colored or red. Rudimentary flowers mostly 1 – 3-awned. Spikes solitary, racemed, or spiked; the rhachis somewhat extended beyond the spikelets. (Named for *Claudius Boutelou*, a Spanish writer upon floriculture and agriculture.)

§ 1. CHONDRÒSIUM, Desv. — *Spikes pectinate, of very many spikelets, oblong or linear, very dense, solitary and terminal or few in a raceme: sterile flowers* 1 – 3 *on the summit of a short pedicel, neutral, consisting of* 1 – 3 *scales and awns.*

1. **B. oligostàchya,** Torr. Glabrous, perennial (6′ – 12′ high); *leaves very narrow;* spikes 1 – 5, the rhachis glabrous; *glumes and lower fertile palea sparingly soft-hairy;* the lobes awl-pointed; *sterile flower copiously villous-tufted at the* summit of the naked pedicel, the 3 awns equalling the larger glume. (Atheropogon, *Nutt.*) — W. Wisconsin? and westward. — Glumes obscurely if at all papillose along the keel. Middle lobe of the lower palea 2-cleft at the tip. Sterile flowers often 2, the second mostly a large awnless scale, becoming hood-like and coriaceous. (Near B. gracilis: perhaps B. juncifolia, *Laq.*)

2. **B. hirsùta,** Lagasca. Tufted from an annual? root (8′ – 20′ high); *leaves flat, lance-linear,* papillose-hairy or glabrous; spikes 1 – 4; *lower glume hispid* with strong bristles *from dark warty glands; lower palea pubescent,* 3-cleft into awl-pointed lobes; *sterile flower and its pedicel glabrous, the* 3 *awns longer than the glumes* and fertile flower. (Atheropogon papillosus, *Engelm.* Chondrosium hirtum, *H. B. K.*) — Sandy plains, Wisconsin, Illinois, and southwestward.

§ 2. ATHEROPÒGON, Muhl. — *Spikes short, numerous in a long and virgate one-sided spike or raceme, spreading or reflexed, each of few* (4 – 12) *spikelets: sterile flowers neutral, rudimentary.*

3. **B. curtipéndula.** Culms tufted from perennial rootstalks (1° – 3° high); sheaths often hairy; leaves narrow; spikes ½′ or less in length, nearly sessile, 30 to 60 in number in a loose general spike (8′ – 15′ long); flowers scabrous; the lower palea of the fertile with 3 short awl-pointed teeth; sterile flower reduced to a single small awn, or mostly to 3 awns shorter than the fertile flower, and 1 or 2 small or minute scales. (B. racemosa, *Lagasca.* Chloris curtipendula, *Michx.* Atheropogon apludioides, *Muhl.* Eutriana curtipendula, *Trin.*) — Calcareous dry hills and plains, S. New York to Wisconsin, and southward. July – Sept. — Passes by transitions into

Var. **aristòsa.** Spikes mostly shorter; sterile flower of a large saccate lower palea, awned at the 2-cleft tip and from the lateral nerves, the stout middle awn often exserted, and sometimes with a rudiment of an inner palea. (Eutriana affinis, *J. D. Hook.*) — Illinois (*Geyer*), Penn.? and southward.

19. GYMNOPÒGON, Beauv. NAKED-BEARD GRASS.

Spikelets of one perfect flower, and the rudiment of a second (consisting of an awn-like pedicel mostly bearing a naked bristle), sessile and remotely alternate on long and filiform rays or spikes, which form a crowded naked raceme. Glumes lance-awl-shaped, keeled, almost equal, rather longer than the somewhat equal membranaceous paleæ; of which the lower is cylindrical-involute, with the midrib produced from just below the 2-cleft apex into a straight and slender bristle-like awn! the upper with the abortive rudiment at its base. Stamens 3. Stigmas pencil-form, purple. — Leaves short and flat, thickish, 1′ – 3′ long. (Name composed of γυμνός, *naked,* and πώγων, *a beard,* alluding to the reduction of the abortive flower to a bare awn.)

1. **G. racemòsus,** Beauv. Culms clustered from a short rootstock (1° high), wiry, leafy; leaves oblong-lanceolate; *spikes flower-bearing to the base* (5′–8′ long), soon divergent; awn of the abortive flower shorter than its stalk, equalling the *pointed glumes,* not more than half the length of the awn of the fertile flower. ♃ (Anthopògon lepturoides, *Nutt.*) — Sandy pine barrens, New Jersey to Virginia, and southward. Aug., Sept.

2. **G. brevifòlius,** Trin. Filiform *spikes long-peduncled, i. e. flower-bearing* only above the middle; lower palea ciliate near the base, short-awned; *awn of the abortive flower obsolete or minute; glumes acute.* ♃ (Anthopògon brevifolius & filiformis, *Nutt.*) — Sussex County, Delaware, and southward.

20. CÝNODON, Richard. BERMUDA GRASS. SCOTCH-GRASS.

Spikelets 1-flowered, with a mere naked short-pedicelled rudiment of a second flower, imbricate-spiked on one side of a flattish rhachis; the spikes usually digitate at the naked summit of the flowering culms. Glumes keeled, pointless, rather unequal. Paleæ pointless and awnless; the lower larger, boat-shaped. Stamens 3. — Low diffusely-branched and extensively creeping perennials, with short flattish leaves. (Name composed of *κύων, a dog,* and *ὀδούς, a tooth.*)

1. **C.** DÁCTYLON, Pers. Spikes 3–5; paleæ smooth, longer than the blunt rudiment. — Penn. and southward; troublesome in light soil. (Nat. from Eu.)

21. DACTYLOCTÈNIUM, Willd. EGYPTIAN GRASS.

Spikelets several-flowered, with the uppermost flower imperfect, crowded on one side of a flattened rhachis, forming dense pectinate spikes, 2–5 in number, digitate at the summit of the culm. Glumes compressed laterally and keeled, membranaceous, the upper (exterior) one awn-pointed. Lower palea strongly keeled and boat-shaped, pointed. Stamens 3. Pericarp a thin utricle, containing a loose globular and rough-wrinkled seed. — Culms diffuse, often creeping at the base. (Name compounded of δάκτυλος, *finger,* and *κτενίον, a little comb,* alluding to the digitate and pectinate spikes.)

1. **D.** ÆGYPTÌACUM, Willd. Spikes 4–5; leaves ciliate at the base. ① (Chloris mucronata, *Michx.*) — Cultivated fields and yards, Virginia, Illinois, and southward. (Adv. from Afr.?)

22. ELEUSÌNE, Gærtn. CRAB-GRASS. YARD-GRASS.

Spikelets 2–6-flowered, with a terminal naked rudiment, closely imbricate-spiked on one side of a flattish rhachis; the spikes digitate. Glumes membranaceous, pointless, shorter than the flowers. Paleæ awnless and pointless; the lower ovate, keeled, larger than the upper. Stamens 3. Pericarp (utricle) containing a loose oval and wrinkled seed. — Low annuals, with flat leaves, and flowers much as in Poa. (Name from Ἐλευσίν, the town where Ceres, the goddess of harvests, was worshipped.)

1. **E.** ÍNDICA, Gærtn. (DOG'S-TAIL OR WIRE GRASS.) Culms ascending, flattened; spikes 2–5 (2′ long, greenish). — Yards, &c., chiefly southward. (Nat. from Ind.?)

23. LEPTÓCHLOA, Beauv. (OXYDÈNIA, *Nutt.*)

Spikelets 3 - many-flowered (the uppermost flower imperfect), loosely spiked on one side of a long filiform rhachis: the spikes racemed. Glumes membranaceous, keeled, often awl-pointed, the upper one somewhat larger. Lower palea 3-nerved, with the lateral nerves next the ciliate or hairy margins awnless, or bristle-awned at the entire or 2-toothed tip, larger than the upper. Stamens 2 or 3. Seed sometimes loose in the pericarp. — Leaves flat. (Name composed of λεπτός, *slender*, and χλόα, *grass*, from the long attenuated spikes.)

§ 1. LEPTOCHLOA PROPER. — *Lower palea awnless or simply awned.*

L. mucronàta, Kunth. Sheaths hairy; spikes numerous (20 - 40, 2' - 4' in length), in a long panicle-like raceme; spikelets small; glumes more or less mucronate, nearly equalling or exceeding the 3 - 4 awnless flowers. ① — Fields, Virginia to Illinois, and southward. August.

§ 2. DIPLÁCHNE, Beauv. — *Lower palea bristle-awned from the 2-toothed apex; the marginal nerves often excurrent into lateral teeth or points.*

2. **L. fasciculàris.** Smooth; leaves longer than the geniculate-decumbent branching culms; the upper sheathing the base of the crowded panicle-like raceme, which is composed of many strict spikes (3' - 5' long); spikelets slightly pedicelled, 7 - 11-flowered, much longer than the lanceolate glumes; paleæ hairy-márgined towards the base; the lower one with 2 small lateral teeth and a short awn in the cleft of the apex. ① (Festuca fascicularis, *Lam.* F. polystachya, *Michx.* Diplachne fascicularis, *Beauv.*, *Torr.*) — Brackish meadows, from Rhode Island southward along the coast, and from Illinois southward on the Mississippi. Aug. — Makes a direct transition to the next genus.

24. TRICÚSPIS, Beauv. (URÁLEPIS & WINDSÒRIA, *Nutt.*)

Spikelets 3 - 12-flowered, somewhat terete; the terminal flower abortive. Glumes unequal. Rhachis of the spikelet bearded below each flower. Paleæ membranaceous or somewhat chartaceous; the lower much larger than the 2-toothed upper one, convex, 2 - 3-toothed or cleft at the apex, conspicuously hairy-bearded or villous on the 3 strong nerves, of which the lateral are marginal or nearly so and usually excurrent, as is the mid-nerve especially, into a short cusp or awn. Stamens 3. Stigmas dark purple, plumose. Grain oblong, mostly gibbous. — Leaves taper-pointed: sheaths bearded at the throat. Panicle simple or compound; the spikelets often racemose, purplish. (Name from the Latin *tricuspis*, three-pointed, alluding to the lower palea.)

§ 1. TRICUSPIS PROPER. (Windsoria, *Nutt.*) — *Glumes shorter than the crowded flowers: lower palea 3-cuspidate by the projection of the nerves, and usually with 2 intermediate membranaceous teeth; the upper palea naked.*

1. **T. seslerioides,** Torr. (TALL RED-TOP.) Culm upright (3° - 5° high), very smooth, as are the flat leaves; panicle large and compound, the rigid capillary branches spreading, naked below; spikelets very numerous, 5 - 7-flowered, shining, purple (¼' long); the flowers hairy toward the base. ♃ (Poa flava, *L.!* P. seslerioides, *Michx.* P. quinquefida, *Pursh.* Windsoria poæ-

formis, *Nutt.* Uralepis cuprea, *Kunth.*) — Dry or sandy fields, S. New York to Illinois, and southward. Aug. — A showy grass, with the spreading panicle sometimes 1° wide. Points of the lower palea almost equal, scarcely exceeding the intermediate teeth, thus appearing 5-toothed.

§ 2. TRIPLÀSIS, Beauv. (Diplòcea, *Raf.* Uralepis, *Nutt.*) — *Glumes much shorter than the somewhat remote flowers: both paleæ strongly fringe-bearded; the lower 2-cleft at the summit, its mid-nerve produced into an awn between the truncate or awn-pointed divisions.*

2. **T. purpùrea.** (SAND-GRASS.) Culms many in a tuft from the same root, ascending (6′–12′ high), with numerous bearded joints; leaves involute-awl-shaped, mostly short; panicles very simple, bearing few 2–5-flowered spikelets, the terminal one usually exserted, the axillary ones included in the commonly hairy sheaths; *awn much shorter than the palea,* frequently *not exceeding its eroded-truncate or obtuse lateral lobes.* ① ? (Aira purpurea, *Walt.* Diplocea barbata, *Raf.* Uralepis purpurea and U. aristulata, *Nutt.*) — In sand, Massachusetts to Virginia along the coast, and southward. Aug., Sept. — Plant acid to the taste.

T. CORNÙTA (Uralepis cornuta, *Ell.* and Triplasis Americana, *Beauv.* !) may perhaps extend north to the borders of Virginia.

25. DUPÓNTIA, R. Brown. DUPONTIA.

Spikelets 2–4-flowered, rather terete. Glumes membranaceous, nearly equalling the remote flowers. A cluster of villous hairs at the base of each flower. Paleæ thin and membranaceous or scarious; the lower one convex, scarcely keeled, faintly nerved, entire, mostly acutish, pointless. Stamens 3. Stigmas plumose. Ovary glabrous. — Perennial and chiefly Arctic grasses, with linear flat leaves, their sheaths closed at the base, the spikelets in a loose panicle. (Named for *M. Dupont,* a writer on the sheaths of the leaves of Grasses.)

(A genus, according to its author, most allied to Deschampsia (Aira), from which it differs in its entire and awnless paleæ, — an alliance strengthened by the following remarkable new species which I venture to place in it; — leaving the genus among the Festucineæ on account of the technical character, as it wants the awn, and because it may include Arctophila of Ruprecht, which verges very close on Colpodium and Glyceria. Fluminia, *Fries,* or Scolochloa, *Link,* (which may occur within our northwestern borders,) is intermediate in character between Dupontia and Tricuspis, but might perhaps be ranged with Arctophila in spite of its teeth, of which there are traces in some genuine Glyceriæ.)

1. **D. Coòleyi.** Tall (2° or more high); leaves roughish, sparsely hairy above; panicle ample, compound; glumes very unequal, the upper (3″ long) scarcely shorter than the spikelet, their midrib and the pedicels rough, the slender rhachis conspicuously and unilaterally bearded for its whole length. — Borders of a swamp, Washington, Macomb County, Michigan. — Flowers in the spike mostly 2 or 3 and a sterile pedicel, whitish, the palea longer and of a firmer texture than those of Aira cæspitosa and A. Bothnica, perfectly entire, acutish, and with a somewhat keel-like roughish midrib: no trace of an awn.

26. DIARRHÈNA, Raf. DIARRHENA.

Spikelets several-flowered, smooth and shining, one or two of the uppermost flowers sterile. Glumes ovate, much shorter than the flowers, coriaceous; the lower one much smaller. Lower palea ovate, convex on the back, rigidly coriaceous, its 3 nerves terminating in a strong and abrupt cuspidate or awl-shaped tip. Squamulæ ovate, ciliate. Stamens 2. Grain very large, obliquely ovoid, obtusely pointed, rather longer than the paleæ, the cartilaginous shining pericarp not adherent to the seed. — A nearly smooth perennial, with running rootstocks, producing simple culms (2° – 3° high) with long linear-lanceolate flat leaves towards the base, naked above, bearing a few short-pedicelled spikelets (½' long) in a very simple panicle. (Name composed of *δίς*, *two*, and *ἄῤῥην*, *man*, from the two stamens.)

1. **D. Americàna,** Beauv. (Festuca diandra, *Michx.*) — Shaded river-banks and woods, Ohio to Illinois and southward. August.

27. DÁCTYLIS, L. COCK'S-FOOT or ORCHARD GRASS.

Spikelets several-flowered, crowded in one-sided clusters, forming a branching dense panicle. Glumes and lower palea herbaceous, keeled, awn-pointed, rough-ciliate on the keel; the 5 nerves of the latter converging into the awn-like point; the upper glume commonly smaller and thinner. Stamens 3. Grain lance-oblong, acute, free. — Perennials: leaves keeled. (Name *Δακτυλίς*, *a finger's breadth*, apparently in allusion to the size of the clusters.)

1. **D. GLOMERÀTA,** L. Rough, rather glaucous (3° high); leaves broadly linear; branches of the panicle naked at the base; spikelets 3 – 4-flowered. — Fields and yards, especially in shade. June. — Good for hay. (Nat. from Eu.)

28. KŒLÈRIA, Pers. KŒLERIA.

Spikelets 3 – 7-flowered, crowded in a dense and narrow spike-like panicle. Glumes and lower palea membranaceous, compressed-keeled, obscurely 3-nerved, barely acute, or the latter often mucronate or bristle-pointed: the former moderately unequal, nearly as long as the spikelet. Stamens 3. Grain free. — Tufted Grasses (allied to Dactylis and Poa), with simple upright culms; the sheaths often downy. (Named for *Prof. Köhler*, an early writer on Grasses.)

1. **K. cristàta,** Pers. Panicle narrowly spiked, interrupted or lobed at the base; spikelets 2 – 4-flowered; lower palea acute or mucronate; leaves flat, the lower sparingly hairy or ciliate. — Var. GRÁCILIS, with a long and narrow spike, the flowers usually barely acute. (K. nitida, *Nutt.*) — Dry hills, Penn. to Illinois, thence northward and westward. (Eu.)

29. EATÒNIA, Raf. (REBOÙLEA, *Kunth*, not of *Raddi.*)

Spikelets usually 2-flowered, and with an abortive rudiment or pedicel, numerous in a contracted or slender panicle, very smooth. Glumes somewhat equal in length, but very dissimilar, a little shorter than the flowers; the lower narrowly linear, keeled, 1-nerved; the upper broadly obovate, folded round the flowers, 3-nerved on the back, not keeled, scarious-margined. Lower palea oblong, obtuse, compressed-boat-shaped, naked, chartaceous; the upper very thin and hyaline. Stamens 3. Grain linear-oblong, not grooved. — Perennial, slender grasses, with simple and tufted culms, and often sparsely downy sheaths, flat lower leaves, and small greenish (or rarely purplish-tinged) spikelets. (Named for *Amos Eaton*, author of a popular Manual of the Botany of the United States, which was for a long time the only general work commonly available for students in this country, and of several other popular treatises.)

1. **E. obtusàta.** *Panicle dense and contracted, somewhat interrupted,* the spikelets much crowded on the short erect branches; *upper glume rounded-obovate, truncate-obtuse,* rough on the back; the flowers lance-oblong. (Aira obtusata, *Michx.* A. truncata, *Muhl.* Kœleria truncata, *Torr.* K. paniculata, *Nutt.* Reboulea gracilis, *Kunth,* in part. R. obtusata, *ed.* 1. Eatonia purpurascens, *Raf.?*) — Dry soil, N. Penn. to Wisconsin, and southward. June, July.

2. **E. Pennsylvánica.** *Panicle long and slender, loose,* the racemose branches somewhat elongated; *upper glume obtuse* or bluntly somewhat pointed; the 2 (rarely 3) flowers lanceolate. (Kœleria Pennsylvanica, *DC.* Aira mollis, *Muhl.* Reboulea Pennsylvanica, *ed.* 1.) — Varies, with a fuller panicle, 6′–8′ long, with the aspect of Cinna (var. MAJOR, *Torr.*); and, rarely, with the lower palea minutely mucronate-pointed! — Moist woods and meadows; common.

30. MÉLICA, L. MELIC-GRASS.

Spikelets 2–5-flowered; the 1–3 upper flowers imperfect and dissimilar, convolute around each other, and enwrapped by the upper fertile flower. Glumes usually large, scarious-margined, convex, obtuse; the upper 7–9-nerved. Paleæ papery-membranaceous, dry and sometimes indurating with age; the lower rounded or flattish on the back, 7–many-nerved, scarious at the entire blunt summit. Stamens 3. Stigmas branched-plumose. — Leaves flat and soft. Panicle simple or sparingly branched; the rather large spikelets racemose-one-sided. (An old name, from *μέλι, honey.*)

1. **M. mùtica,** Walt. Panicle simple or branched; glumes unequal, the larger almost equalling the spikelet; fertile flowers 2; lower palea naked, glabrous but minutely scabrous on the nerves. ♃ (M. glabra, *Michx.* M. speciosa, *Muhl.*) — Var. GLÀBRA (M. glabra, *Pursh.*) has the panicle often few-flowered and rather simple, the lower palea very blunt. — Var. DIFFÙSA (M. diffusa, *Pursh*) is taller, 2½°–4° high, with a more compound and many-flowered panicle; the lower palea commonly more scabrous and its tip narrower. — Rich soil, W. Penn. to Wisconsin, and southward. June.

31. GLYCÈRIA, R. Brown, Trin. MANNA-GRASS.

Spikelets terete or flattish, several–many-flowered; the flowers mostly early deciduous by the breaking up of the rhachis into joints, leaving the short and unequal 1–3-nerved membranaceous glumes behind. Paleæ naked, of a rather firm texture, nearly equal; the lower rounded on the back, scarious (and sometimes obscurely toothed) at the blunt or rarely acute summit, glabrous, 5–7-

nerved, the nerves parallel and separate. Stamens 3 or 2. Stigmas plumose, mostly compound. Ovary smooth. Grain oblong, free. — Perennial, smooth marsh-grasses, mostly with creeping bases or rootstocks; the spikelets in a racemose panicle. (Name from γλυκερός, *sweet*, in allusion to the taste of the grain.)

§ 1. GLYCERIA PROPER. — *Lower palea conspicuously nerved: styles present: plumes of the stigma branched or toothed: grain grooved on the inner side: leaves flat, the sheaths nearly entire.*

* *Spikelets in a crowded panicle, ovate, turgid, more or less compressed; the flowers crowded: lower palea ovate, entire, not very strongly nerved, of a firm texture, in No. 1 becoming ventricose after flowering (almost as in* Briza*): upper palea very obtuse and entire: stamens* 2.

1. **G. Canadénsis,** Trin. (RATTLESNAKE-GRASS.) *Panicle oblong pyramidal, at length spreading,* and the tumid 6–8-flowered *spikelets drooping;* lower palea acutish, longer than the rounded upper one; leaves long, roughish. (Briza Canadensis, *Michx.* Poa Canadensis, *Beauv.*) — Boggy places, New England to Penn., Wisconsin, and common northward. July. — A handsome, stout grass, 2°–3° high. *Spikelets* 2″ long, *becoming very broad: glumes purplish.*

2. **G. obtùsa,** Trin. *Panicle narrowly oblong, dense;* the 6–7-flowered *spikelets erect, short-pedicelled;* lower palea obtuse, the upper as long when old. (Poa obtusa, *Muhl.*) — Bogs, E. New England to Penn., near the coast; rare. Aug. — Culm stout, 1°–2° high, very leafy: leaves long, smooth. Spikelets 3″ long, pale.

3. **G. elongàta,** Trin. *Panicle narrowly racemose, elongated* (1° long), *recurving;* the branches appressed, bearing the 3–4-flowered erect short-pedicelled spikelets nearly to the base; lower palea obtuse, rather longer than the upper; leaves very long (1° or more), rough. (Poa elongata, *Torr.*) — Wet woods, New England to Michigan, and northward. July. — Spikelets pale, 1″–1½″ long.

* * *Spikelets oblong, diffusely panicled, nearly terete: lower palea oblong or oval, truncate-obtuse, prominently 7-nerved; the upper one 2-toothed: stamens* 3.

4. **G. nervàta,** Trin. Branches of the broad and open *panicle* capillary, *at length drooping, the very numerous small spikelets ovate-oblong,* 3–7-flowered; leaves rather long. (Poa nervata, *Willd.* P. striata, *Michx.* P. parviflora, *Pursh.*) — Moist meadows; very common. June. — Culm erect, 1°–3° high. Spikelets seldom 2″ long, commonly purplish.

5. **G. pállida,** Trin. *Branches of the rather simple panicle capillary, erect-spreading,* rough; the *spikelets usually few, somewhat appressed, oblong-linear,* 5–9-flowered (pale, ¼′ long); *lower palea oblong, minutely* 5-*toothed,* the upper lanceolate, conspicuously 2-toothed; leaves short, sharp-pointed, pale. (Windsoria pallida & Poa dentata, *Torr.*) — Shallow water; common, especially northward. July. — Culms slender, 1°–3° long, ascending from a creeping base.

6. **G. aquática,** Smith. (REED MEADOW-GRASS.) *Panicle much branched, ample* (8′–15′ long); *the numerous branches ascending, spreading with age; spikelets oblong or linear-oblong,* 5–9-flowered (usually purplish, 2″–3″ long);

lower palea entire; leaves large (1°–2° long, ⅓' to ½' wide). — Wet meadows, &c.; common northward. July. — Culm stout, upright, 3°–5° high. (Eu.)

* * * *Spikelets linear (½'–1' long), terete, pale, appressed on the branches of the long and narrow racemose panicle: paleæ minutely roughish; the upper 2-toothed: stamens 3: squamulæ unilateral or united: ligule long: culm flattened, ascending from a rooting base.* (Glyceria, *R. Brown.*)

7. **G. flùitans,** R. Brown. Spikelets 7–13-flowered; *lower palea oblong, obtuse,* or the scarious tip acutish, entire or obscurely 3-lobed, usually rather longer than the blunt upper one. (G. plicata, *Fries.*) — Shallow water; common, especially northward. June–Aug. — Culm thickish, 1°–5° long. Leaves short and rather broad, very smooth. Panicle 1° long: the simple branches appressed, finally spreading below. (Eu.)

8. **G. acutiflòra,** Torr. Spikelets 5–12-flowered, few and scattered; *lower palea oblong-lanceolate, acute, shorter than the long tapering point of the upper one.* — Wet places, Penn. to New England; rather rare. June. — Resembles the last; but the erect leaves smaller, the separate flowers twice the length (½' long) and less nerved.

§ 2. HELEÓCHLOA, Fries. (Sclerochloa, *ed.* 1.) — *Lower palea inconspicuously or obsoletely 5-nerved: stigmas nearly sessile and simply plumose: grain hardly grooved: saline species: panicle contracted with age.*

9. **G. marítima,** Wahl. (Sea Spear-Grass.) *Sterile shoots procumbent runner-like*; flowering culms erect (1°–1½° high); *branches of the panicle solitary or in pairs*; spikelets oblong or linear, 4–8-flowered; lower palea rounded at the summit, slightly pubescent towards the base; leaves somewhat involute; ligule elongated. (Poa maritima, *Huds.*) — Sea-coast; not rare. (Eu.)

10. **G. distans,** Wahl. Culms geniculate at the base, ascending, *destitute of running shoots; branches of the panicle 3–5 in a half whorl,* spreading; spikelets 3–6-flowered; lower palea truncate-obtuse; leaves mostly flat; ligule short. (P. fasciculata, *Torr.* P. distans, *L.* P. arenaria, *Retz*) — Salt marshes along the coast. — Probably only a form of the last. (Eu.)

32. BRIZOPỲRUM, Link. Spike-Grass.

Spikelets and numerous flowers compressed, crowded in a densely spiked or capitate panicle. Glumes herbaceous or membranaceous; the lower faintly many-nerved. Lower palea rather coriaceous, flattened-boat-shaped, indistinctly many-nerved, acute. Ovary stalked. — Flowers mostly diœcious, pretty large. Leaves crowded on the culms, involute, commonly rigid. (Name compounded of *Briza* (No. 35), and πυρός, *wheat.*)

1. **B. spicàtum,** Hook. Culms tufted, from creeping rootstocks (9'–18' high); spike oblong, flattened (1' long); spikelets ovate or oblong, 5–10-flowered; flowers smooth and naked; grain pointed. (Uniola spicata, *L.* Poa Michauxii, *Kunth.*) — Salt marshes and shores. Aug. — Pistillate flowers more rigid and almost keeled, with very long plumose stigmas; the sterile smaller and somewhat rounded on the back.

88. PÒA, L. Meadow-Grass. Spear-Grass.

Spikelets ovate, or lance-ovate, compressed, several- (2 – 10-) flowered, in an open panicle. Glumes mostly shorter than the flowers; the lower smaller. Lower palea membranaceo-herbaceous, with a delicate scarious margin, compressed-keeled, pointless, 5-nerved (the intermediate nerves more obscure or obsolete), the principal nerves commonly clothed at and towards the base with soft hairs or long and crisped cobweb-like wool; upper palea membranaceous, 2-toothed. Stamens 2 or 3. Stigmas simply plumose. Grain oblong, free. — Culms tufted. Leaves smooth, usually flat and soft. (An ancient Greek name for Grass.)

* *Root annual: branches of the short panicle single or in pairs.*

1. **P. ánnua,** L. (Low Spear-Grass.) Culms spreading or decumbent (3′ – 8′ long), flattened; panicle often 1-sided; spikelets crowded, very short-pedicelled, 3 – 7-flowered; lower palea delicately more or less hairy on the nerves below. — Cultivated and waste grounds, everywhere: but doubtful if really indigenous here. April – Oct. (Eu.)

* * *Root perennial: culms tufted, often stoloniferous at the base.*

+ *Branches of the simple panicle mostly solitary or in pairs, short but slender, smooth, bearing single or few purplish spikelets.* (*Alpine.*)

2. **P. láxa,** Hænke. Culms upright (4′ – 9′ high); panicle nodding, often racemose-contracted; spikelets ovate, 3 – 5-flowered; lower palea obscurely nerved, villous on the midrib and marginal nerves below; leaves narrow; ligules elongated. — Alpine mountain-tops of Maine, New Hampshire, and N. New York, and high northward. (The nearly related P. alpina is found in Canada, and may occur within our borders.) (Eu.)

+ + *Branches of the very loose panicle long and capillary, mostly in pairs or in threes, naked below (more or less scabrous): spikelets few or widely scattered, pretty large (3″ – 4″ long, pale-green, sometimes purple-tinged), loosely 3 – 5-flowered: culm flattish (1° – 2° high), plant soft and smooth, flowering in spring.*

++ *Flowers (oblong) obtuse, as also the larger glume: panicle diffuse: lower palea rather conspicuously scarious at the apex, villous below the middle on the keel and marginal nerves.*

3. **P. brevifòlia,** Muhl. Culm stoloniferous from the base, 2 – 3-leaved, the *upper leaves very short* (½′ – 2′ *long*), *lanceolate, all abruptly cuspidate-tipped;* branches of the short panicle mostly in pairs; *lower palea rather obscurely nerved, cobwebby at the base.* (P. pungens, *Nutt.*, excl. syn. *Ell.* P. cuspidata, *Barton.* The older and also more appropriate name is here restored.) — Rocky or hilly woodlands, Pennsylvania, Virginia, and sparingly westward. April, May. — Culm scarcely surpassing the long root-leaves.

4. **P. flexuòsa,** Muhl. Culm slender (not stoloniferous?); its *leaves all linear* (2′ – 5′ *long*) *and gradually taper-pointed; panicle very effuse* (its branches 2′ – 4′ long to the spikelets or first ramification); *lower palea prominently nerved, no web* at the base. (P. autumnalis, *Muhl. in Ell.* P. cámpyle, *Schult.*) — Dry woods, Virginia, Kentucky, and southward. Feb. – May. — Wrongly confounded with the last, though near it. P. autumnalis is an inappropriate name, and there is now no obstacle to restoring the earlier published and unobjectionable (but not descriptive) name of P. flexuosa.

++ ++ *Flowers (oblong-lanceolate) and both glumes acute: panicle narrow.*

5. **P. alsòdes.** Leaves rather narrowly linear, acute, the uppermost (2½′ – 4′ long) often sheathing the base of the panicle, the capillary branches of which are appressed when young, and mostly in threes or fours; spikelets 3-flowered (pale green, soft); lower palea very obscurely nerved, villous on the keel below, and with a narrow cobwebby tuft at its base, otherwise glabrous. (P. nemoralis, *Torr. & ed.* 1: but wholly different from the European species of that name.) — Woods, on hill-sides, New England to Wisconsin. May, June.

+ + + *Branches of the rather narrow but loose long-peduncled panicle in threes or fives, or rarely in pairs, short or shortish, above bearing scattered and rather few spikelets; these barely 2″ long, pale green, rather loosely 2 – 4-flowered: flowers (oblong) and glumes obtuse; lower palea scarcely scarious-tipped: plant very smooth, slender (1½° – 3° high): culm-leaves lance-linear, acute, 1½′ – 3′ long, soft.*

6. **P. débilis,** Torr. *Culm terete,* weak; branches of the small panicle slender (the lower 1½′ – 2′ long to the few spikelets), in pairs and threes; *flowers very obtuse, smooth and glabrous,* except a sparing web at their base. — Rocky woodlands, Rhode Island and N. New York to Wisconsin. May.

7. **P. sylvéstris.** *Culm flattish,* erect; branches of the oblong-pyramidal panicle short, in fives or more; *lower palea villous on the keel for its whole length, and on the margins below the middle,* sparingly webbed at the base. — Rocky woods and meadows, Ohio to Wisconsin, Kentucky, and southward. June.

+ + + + *Branches of the narrow or oblong panicle mostly short, in fives or sometimes in twos and threes, rough, mostly compound and bearing very numerous closely-flowered spikelets: flowers acute or acutish, more or less webbed at the base.*

++ *Panicle open, its branches in fives: the 3 – 5-flowered spikelets all distinctly pedicelled, acute, slightly flattened; lower palea villous or pubescent on the keel and marginal nerves, the intermediate nerves obsolete: culms erect (2° – 3° high), terete, growing in tufts, not at all stoloniferous at the base.*

8. **P. serótina,** Ehrhart. (False Red-top. Fowl Meadow-Grass.) Leaves narrowly linear; *ligules elongated;* spikelets 2 – 4- (rarely 5-) flowered (1″ – 2″ long); *flowers acutish,* green, often tinged with dull purple. (P. nemoralis, *Pursh.* P. crocata, *Michx.* belongs to this or the next.) — Wet meadows and low banks of streams; common everywhere northward. July, Aug. — A good grass for moist meadows. (Eu.)

9. **P. nemoràlis,** L. Leaves linear; *ligules obsolete or very short; spikelets 4 – 5-flowered, rather larger,* and the *flowers and glumes more sharply acute* and narrower; otherwise nearly as in the preceding, which is too nearly related to it. — Wisconsin (*Lapham*), and northward. (Eu.)

++ ++ *Panicle with the flattened spikelets crowded on the branches, mostly short-pedicelled, sometimes almost sessile: culms stoloniferous at the base, except in No.* 10.

10. **P.** TRIVIÀLIS, L. (Rough Meadow-Grass.) *Culms* (1° – 3° high) *and sheaths usually rather rough;* branches of the pyramidal diffuse panicle mostly in fives; spikelets 3 – 5-flowered; *flowers* acute, *prominently* 5-*nerved,* a little hairy on the keel, otherwise glabrous; *ligule acute, oblong.* — Moist meadows; less common and less valuable than the next. July. (Nat. from Eu.)

11. **P. praténsis,** L. (GREEN or COMMON MEADOW-GRASS.) *Culms* (1° – 3° high, from a creeping base) *and sheaths smooth;* branches of the pyramidal panicle commonly in fives, spreading; spikelets 3 – 5-flowered; *flowers 5-nerved,* lance-ovate, acute, hairy on the marginal nerves and keel; *ligule blunt, short.* — Common in dry soil: imported for pastures and meadows. Indigenous at the White Mountains of New Hampshire and northward. May – July. (Eu.)

12. **P. compréssa,** L. (BLUE-GRASS. WIRE-GRASS.) *Culms much flattened, obliquely ascending* (9′ – 18′ high) from a creeping base, the uppermost joint near the middle; leaves short, bluish-green; *panicle dense and contracted* (expanding just at flowering), partly one-sided; the short branches often in pairs, covered to near the base with the 4 – 9-flowered flat spikelets; flowers linear-elliptical, rather obtuse, hairy below on the lateral nerves and keel; ligule short and blunt. — Dry fields and banks, probably introduced with other and more valuable grasses; rarely in woods: apparently truly indigenous northward. (Eu.)

34. ERAGRÓSTIS, Beauv. ERAGROSTIS.

Spikelets 2 – 70-flowered, nearly as in Poa, except that the lower palea is but 3- (rarely 1-) nerved, not webby-haired at the base, and deciduous; the upper persistent on the entire rhachis after the rest of the flower has fallen. — Culms often branching. Leaves linear, frequently involute, and the ligule or throat of the sheath bearded with long villous hairs. Panicle various. (An early name, probably from *ἔρα, earth,* and *Agrostis,* in allusion to the procumbent habit of the original species.)

* *Prostrate and creeping, much-branched: root annual: spikelets flat, imperfectly diœcious, clustered, almost sessile, in the more fertile plant almost capitate.*

1. **E. réptans,** Nees. Spikelets linear-lanceolate, 10 – 30-flowered, almost sessile; flowers lance-ovate, acute; leaves short, almost awl-shaped, smoothish. (Poa reptans, *Michx.*) — Gravelly river-borders; common. August. — Flower-branches 2′ – 5′ high.

* * *Diffusely spreading, or the flowering culms ascending, low* (6′ – 15′ *high*): *spikelets large* (¼′ – ¾′ *long*), *densely-flowered, flat, forming a narrow crowded panicle.*

2. **E.** POÆOÌDES, Beauv. Lower sheaths often hairy; leaves flat, smooth; spikelets short-pedicelled, lance-linear or oblong-linear, 8 – 20-flowered, lead-colored (2″ – 5″ long); flowers ovate, obtuse, the lateral nerves evident. (Poa Eragrostis, *L.*) — Sandy waste places, eastward; scarce. (Nat. from Eu.)

Var. MEGASTÀCHYA. Sheaths mostly glabrous; spikelets larger (¼′ – ¾′ long), becoming linear, whitish when old, 10 – 50-flowered. (E. megastachya, *Link.* Briza Eragrostis, *L.*) — Similar situations, and more common. Aug. — Emits a sharp, unpleasant odor. (Nat. from Eu.)

* * * *Erect, or in No.* 3 – 5 *diffusely spreading and ascending: panicle open, its branches capillary; the spikelets proportionally small, sometimes minute.* (*Number of flowers in the spikelet very variable, according to age, &c.*)

+– *Culms slender, branching and decumbent or spreading at the base, from an annual root: leaves narrow, flat, soft: branches of the narrow panicle rather short and thickly-flowered, not bearded in the axils, except sometimes the lowest sparingly.*

3. **E. PILÒSA**, Beauv. Panicle elongated-oblong, with rather erect branches (except at flowering-time); *spikelets* 5–12-flowered (2″–4″ long, purplish-lead-color), becoming linear, *about equalling their pedicels: glumes* (small) *and lower palea obtuse*, the latter broadly ovate, 1-*nerved* (lateral nerves obsolete). (P. pilosa, *L.* P. Linkii, *Kunth*.) — Sandy or gravelly waste places, S. New England to Illinois, and southward. Aug. — Plant 6′–12′ high. (Nat. from Eu.)

4. **E. Fránkii**, Meyer. Much branched, diffuse (3′–8′ high); panicle ovate-oblong, rather dense, spreading; *spikelets* 2–5-*flowered* (1″–1½″ long) *on slender pedicels; glumes very acute; lower palea ovate, acute*, rather obscurely 3-*nerved*. (E. erythrógona, *Nees*, from the joints of the culm being mostly reddish.) — Low or sandy ground, Ohio to Illinois (opposite St. Louis, *Drummond*, *Engelmann*), and southwestward. Aug.

5. **E. Púrshii**, (Bernh.?) Schrad. Sparingly branched at the decumbent base, then erect (½°–2° high); panicle elongated, the branches widely spreading, very loose; *spikelets* 5–18-*flowered*, oblong-lanceolate, becoming linear (2″–4½″ long), *mostly much shorter than their capillary pedicels; glumes and lower palea ovate and acute, or the latter acutish*, 3-*nerved*. (Poa tenella? *Pursh*. P. Caroliniana, *Spreng.* P. pectinacea of authors, not of *Michx.*) — Sandy or sterile open grounds, New Jersey to Virginia, and southward.

++ *Culms simple or branching only at the very base, firm, erect, from an annual or perennial root, mostly forming thick tufts: leaves very long; panicle very large, compound, often longer than the culm, with elongated and loosely flowered branches; their axils often bearded.*

6. **E. ténuis.** *Panicle virgately elongated* (1°–2½° long), very loose, the spreading branches bearded in some of the lower axils, their remote divisions and long *diverging pedicels* capillary; spikelets 2–6- (sometimes 7–12-) flowered, pale or greenish; *glumes lanceolate or awl-shaped, very acute* (1½″–2″ long), membranaceous, as are the *oblong-lanceolate acute flowers: lower palea distinctly 3-nerved;* the upper ciliate-scabrous. ♃? (Poa tenuis, *Ell.* P. capillaris, *Michx.* P. trichodes, *Nutt.* E. Geyeri, *Steud.*) — Sandy soil, Illinois, Virginia? and southward. Aug.–Oct. — Leaves rather rigid, 1½°–2° long, glabrous or sparingly hairy: the sheaths hairy or glabrous; the throat strongly bearded. Flowers much larger than in the next, fully 1½″ long.

7. **E. capillàris**, Nees. *Panicle widely expanding*, usually much longer than the culm, its spreading branches (mostly naked in the axils) and long *diverging pedicels* capillary; *spikelets rather terete*, very small, 2–4-flowered, greenish or purplish; *glumes and flowers ovate, acute* (less than 1″ long); *lower palea obscurely* 3-*nerved*, scarcely keeled, the upper rough-ciliate. ① (Poa capillaris, *L.* P. hirsuta, *Michx.*) — Sandy dry soil and fields; common, especially southward. Aug., Sept. — Leaves and sheaths either very hairy or nearly glabrous, the former about 1° long, not rigid. Panicle 1°–2° long, becoming very wide and diffuse.

8. **E. pectinàcea.** *Panicle widely diffuse*, its rigid divergent main branches *bearded in the axils; the capillary pedicels more or less appressed* on the secondary branches; *spikelets flat*, 5–15-flowered, becoming linear, purple or purplish-tinged; glumes and flowers ovate or oblong-ovate, acutish; lower *palea*

strongly 3-nerved; the upper hirsute-ciliate. ♃ ? (Poa pectinacea, *Michx.*, ex char. P. Virginica, *Zucc.?* P. hirsuta, *Amer. auth.*, not of *Michx.* E. Unionis & cognata, *Steud.?*) — Leaves long, rigid, mostly hairy, the sheaths especially so. — Var. SPECTÁBILIS. Leaves and sheaths mostly glabrous; branches of the panicle (the lower reflexed with age) and pedicels mostly shorter; spikelets rather larger. (E. spectabilis, *ed.* 1. Poa spectabilis, *Pursh.*) — Sandy dry ground, from E. Massachusetts southward near the coast, and from Ohio and Illinois southward. Aug.-Oct. — Plant 1°-3° high. Spikelets 1½″-3″ long, about 1″ wide, closely flowered.

35. BRÌZA, L. QUAKING GRASS.

Spikelets many-flowered, ovate or heart-shaped, flattish-tumid; the flowers closely imbricated. Glumes roundish, unequal (purple). Lower palea roundish and entire, flattened parallel with the glumes, ventricose on the back, heart-shaped at the base, papery-membranaceous and becoming dry, scarious-margined, obscurely many-nerved; the upper palea very much smaller, ovate, flat. Stamens 3. Stigmas branched-plumose. Grain flattened parallel with the paleæ, adhering to the upper one. — Leaves flat. Panicle loose, diffuse, with the large and showy spikelets often drooping on delicate pedicels (whence the name, an ancient Greek appellation for some kind of grain, from βρίζω, *to slumber* (Linn.), or βρίθω, *to bend downwards*).

1. **B. MÈDIA**, L. Panicle erect, the branches spreading; spikelets 5-9-flowered (3″ long); glumes shorter than the lower flowers. ♃ — Pastures; sparingly in E. Massachusetts and in Penn. June. (Adv. from Eu.)

B. MÁXIMA, L., an annual with much larger and many-flowered spikes, is occasionally cultivated for ornament.

36. FESTÙCA, L FESCUE-GRASS.

Spikelets 3-many-flowered, panicled or racemose; the flowers not webby at the base. Glumes unequal, mostly keeled. Paleæ chartaceous or almost coriaceous, roundish (not keeled) on the back, more or less 3-5-nerved, acute, pointed, or often bristle-awned, rarely blunt; the upper mostly adhering at maturity to the enclosed grain. Stamens mostly 3. — Flowers, and often the leaves, rather dry and harsh. (An ancient Latin name.)

* *Flowers bristle-pointed or awned from the tip: panicle racemose-contracted.*

1. **F. tenélla**, Willd. Panicle spike-like, somewhat one-sided (2′-3′ long); *spikelets* 7-9-*flowered; awn of the involute-awl-shaped palea slender;* leaves bristle-form. ① — Dry sterile soil; not rare. July. — Culms very slender, 6′-12′ high.

2. **F. ovìna.** (SHEEP'S FESCUE-GRASS.) Panicle narrow; *spikelets* 2-6-*flowered; awn much shorter than the lanceolate palea*, or almost wanting; leaves convolute-filiform; culms 6′-15′ high, forming dense-rooted tufts. ♃ — N. E. New England, Lake Superior, and northward. — Var. VIVÍPARA (which with us has running rootstocks), with the spikelets partially converted into leafy shoots, is found on the alpine summits of the White Mountains of New Hampshire, and high northward. (Eu.)

Var. duriúscula. Taller; panicle more open or compound; leaves flat, becoming convolute; spikelets 4 – 8-flowered. (F. duriuscula, *L.*) — N. New England and northward. Also sparingly naturalized from Europe in dry pastures eastward. June.

* * *Flowers awnless and mostly almost pointless: panicle open: grain often free!*

3. **F.** ELÀTIOR, L. (in part). *Panicle* contracted before and after flowering, *erect, with short branches;* spikelets crowded, 5 – 10-flowered (about ½′ long); the *flowers rather remote, oblong-lanceolate;* leaves flat; culms 1° – 4° high from a short creeping rootstock. ♃ (F. pratensis, *Huds.*) — Moist meadows and near dwellings. June. — A pretty good meadow-grass. (Nat. from Eu.)

4. **F. nùtans,** Willd. *Panicle of several long and slender spreading branches,* mostly in pairs, *drooping* when old, rough, bearing near their extremity a few ovate 3 – 5-flowered spikelets (¼′ long) on pretty long pedicels; *flowers ovate-oblong, rather obtuse, close together,* coriaceous, smooth, very obscurely 5-nerved. ♃ — Rocky woods and copses. July. — Culm 2° – 4° high, naked above: leaves broadly linear, taper-pointed, dark green, often rather hairy.

37. BRÒMUS, L. BROME-GRASS.

Spikelets 5 – many-flowered, panicled. Glumes unequal, membranaceous, the lower 1 – 5-, the upper 3 – 9-nerved. Lower palea either convex on the back or compressed-keeled, 5 – 9-nerved, awned or bristle-pointed from below the mostly 2-cleft tip: upper palea at length adhering to the groove of the oblong or linear grain. Stamens 3. Styles attached below the apex of the ovary. — Coarse grasses, with large spikelets, at length drooping, on pedicels thickened at the apex. (An ancient name for the Oat, from βρόμος, *food.*)

§ 1. EÙBROMUS. — *Lower palea convex on the back; the flowers imbricated over one another before expansion: lower glume* 3 – 5-, *the upper* 5 – 9-*nerved.*

* *Annuals or biennials: introduced.*

1. **B.** SECALÌNUS, L. (CHEAT or CHESS.) *Panicle spreading, even in fruit,* the drooping peduncles but little branched; *spikelets oblong-ovate, turgid, smooth, of* 8 – 10 rather distant flowers; lower palea rather longer than the upper, its *awn short,* sometimes very short or none; sheaths nearly glabrous. — Grain-fields, too common: also escaped into barren or waste grounds. June, July. (Adv. from Eu.)

2. **B.** RACEMÒSUS, L. (UPRIGHT CHESS.) *Panicle erect,* simple, rather narrow, *contracted in fruit;* flowers closer, more imbricated; *lower palea* decidedly exceeding the upper, *bearing an awn of its own length;* culm more slender; sheaths sometimes hairy: otherwise nearly as in the last, for which it is often mistaken in this country. — Grain-fields; not rare. (Adv. from Eu.)

3. **B.** MÓLLIS, L. (SOFT CHESS.) *Panicle erect, closely contracted in fruit; spikelets conical-ovate,* somewhat flattened; the flowers closely imbricated, *downy* (as also the leaves, &c.); *lower palea acute,* long-awned. — Wheat-fields, New York and Penn.; scarce. June. (Adv. from Eu.)

* * *Perennial: indigenous. (Lower glume strongly 3-, the upper 5-nerved.)*

4. **B. Kálmii.** (WILD CHESS.) Panicle simple, small (3′ – 4′ long), the spikelets drooping on capillary peduncles, closely 7 – 12-flowered, densely

silky all over; awn only one third the length of the lance-oblong flower; lower palea 7–9-nerved, much longer and larger than the upper; culm slender (1½°–3° high); leaves and sheaths conspicuously or sparingly hairy. (B. ciliatus, *Muhl.* B. purgans, *Torr. Fl. N. Y.*) — Dry woodlands and open places; common northward. June, July. — This is preserved in the herbarium of Linnæus under the name of B. ciliatus, though it is not the plant he has described; thence has arisen much confusion.

§ 2. SCHEDÓNORUS, Beauv., Fries. — *Lower palea somewhat convex, but keeled on the back, laterally more or less compressed, at least above: flowers soon separating from each other: lower glume* 1- *the upper 3-nerved.*

5. **B. ciliàtus,** L. *Panicle compound,* very loose, *the elongated branches at length divergent,* drooping; spikelets 7–12-flowered; flowers lanceolate, tipped with an *awn half to three fourths their length;* lower palea silky with appressed hairs near the margins, at least below (or rarely naked), smooth or smoothish on the back (B. Canadensis, *Michx.* B. pubescens, *Muhl.*); — or, in var. PÚRGANS (B. purgans, *L.!*), clothed all over with very short and fine appressed hairs. ♃ — River-banks and moist woodlands; rather common. July, Aug. — Culm 3°–4° high, with the large leaves (¼′–½′ wide) smooth or somewhat hairy; the sheaths in the larger forms often hairy or densely downy near the top. — Variable as to the pubescence, &c., and comprising several forms, including both the Linnæan species; for which the present name is preferable to the inapplicable *purgans,* which was taken from Feuillé's South American species. — In a large-flowered form, two obscure additional nerves appear in the upper glume.

6. **B.** STÉRILIS, L. *Panicle very loose,* the slender and nearly simple branches *drooping; spikelets* of about 6 rather distant and 7-nerved *roughish* linear-awl-shaped long-awned *flowers;* leaves rather hairy. ① — Penn Yan, New York, *Sartwell.* July. (Adv. from Eu.)

38. UNÌOLA, L. SPIKE-GRASS.

Spikelets closely many-flowered, very flat and 2-edged; one or more of the lowest flowers sterile (neutral) and consisting of a single palea. Glumes lanceolate, compressed-keeled. Lower palea coriaceo-membranaceous, strongly laterally compressed and keeled, striate-nerved, usually acute or pointed, entire, enclosing the much smaller compressed 2-keeled upper one and the free laterally flattened smooth grain. Stamen 1 (or in U. paniculata 3). — Upright smooth perennials, growing in tufts from strong creeping rootstocks, with broad leaves and large spikelets in an open or spiked panicle. (Ancient name of some plant, a diminutive of *unio,* unity.)

* *Spikelets large* (½′–2′ *long*), *ovate or oblong,* 9–30-*flowered: panicle open.*

1. **U. paniculàta,** L. *Leaves narrow* when dry, convolute; *spikelets ovate, short-pedicelled;* flowers glabrous, bluntish, several of the lower sterile; the fertile with 3 stamens; culm and panicle elongated (4°–8° high). — Sand-hills on the sea-shore, S. Virginia and southward.

2. **U. latifòlia,** Michx. *Leaves broad* and flat (¾′–1′ wide); *spikelets* at length *oblong, hanging on long pedicels;* flowers acute, ciliate on the keel, all but

the lowest perfect and monandrous. — Shaded rich hill-sides, S. Penn. to Illinois and southward. Aug. — Culm 2°–4° high: panicle loose.

* * *Spikelets small: panicle contracted and wand-like: perfect flowers long-pointed.*

3. **U. grácilis,** Michx. *Spikelets short-pedicelled* (2″–3″ long), broadly wedge-shaped, acute at the base, 4–8-*flowered:* the flowers ovate and divergently beaked, long, the lowest one neutral. — Sandy soil, from Long Island to Virginia, near the coast, and southward. Aug. — Culm 3° high, slender.

39. PHRAGMÌTES, Trin. Reed.

Spikelets 3–7-flowered; the flowers rather distant, silky-villous at their base, and with a conspicuous silky-bearded rhachis, all perfect and 3-androus, except the lowest, which is either neutral or with a single stamen, and naked. Glumes membranaceous, shorter than the flowers, lanceolate, keeled, sharp-pointed, very unequal. Paleæ membranaceous, slender; the lower narrowly awl-shaped, thrice the length of the upper. Squamulæ 2, large. Styles long. Grain free. — Tall and stout perennials, with numerous broad leaves, and a large terminal panicle. (Φραγμίτης, *growing in hedges,* which this aquatic Grass does not.)

1. **P. communis,** Trin. Panicle loose, nodding; spikelets 3–5-flowered; flowers equalling the wool. (Arundo, *L.*) — Edges of ponds and swamps; common northward. Sept. — Looks like Broom-corn at a distance, 5°–12° high: leaves 2′ wide. (Eu.)

40. ARUNDINÀRIA, Michx. Cane.

Spikelets flattened, 5–14-flowered; the flowers somewhat separated on the jointed rhachis. Glumes very small, membranaceous, the upper one larger. Paleæ herbaceous or somewhat membranaceous; the lower convex on the back, not keeled, many-nerved, tapering into a mucronate point or bristle. Squamulæ 3, longer than the ovary. Stamens 3. Grain oblong, free. — Arborescent or shrubby Grasses, simple or with fascicled branches, and with large spikelets in panicles or racemes; the flowers polygamous, viz. perfect and staminate. (Name formed from *arundo,* a reed.)

1. **A. macrospérma,** Michx. Spikelets (1½′–3′ long) rather few in a simple panicle, sometimes solitary on a slender peduncle; leaves linear-lanceolate, pubescent beneath: — in the Small Cane ½′–1′ wide, in the Tall Cane 1′–2′ wide. Culm of the latter sometimes 20°–35°, in cane-brakes; but it very rarely blossoms. — In rich soil, Virginia, Kentucky, and southward. April.

41. LEPTÙRUS, R. Brown. Lepturus.

Spikelets solitary on each joint of the filiform rhachis, and partly immersed in the excavation, 1–2-flowered. Glumes 1–2, including the 2 thin pointless paleæ. Stamens 3. Grain free, oblong-linear, cylindrical. — Low and branching, often procumbent Grasses, chiefly annuals, with narrow leaves and slender spikes (whence the name, from λεπτός, *slender,* and οὐρά, *tail*).

1. **L.? paniculàtus,** Natt. Stem slender (6′–20′ long), naked and curved above, bearing 3–9 racemosely disposed thread-like and triangular

spikes; glumes 2, transverse. — Open grounds and salt licks, Illinois (*Mead*), and westward. Aug.

42. LÓLIUM, L. DARNEL.

Spikelets many-flowered, solitary on each joint of the continuous rhachis, placed edgewise; the glume, except in the terminal spikelet, only one and external: — otherwise chiefly as in Triticum. (The ancient Latin name.)

1. **L. perénne**, L. (COMMON DARNEL. RAY- or RYE-GRASS.) *Glume much shorter than the spikelet; flowers* 6 – 9, *awnless*, rarely awn-pointed. ♃ — Meadows and lots; eastward. June. — A pretty good pasture-grass. (Nat. from Eu.)

2. **L. temuléntum**, L. (BEARDED DARNEL.) *Glume fully equalling the* 5 – 7-flowered *spikelet; awn longer than the flower* (½′ long). ① — Grain-fields, Massachusetts and Penn.: rare. — Grain noxious; almost the only such instance among Grasses. (Adv. from Eu.)

43. TRÍTICUM, L. WHEAT.

Spikelets 3 – several-flowered, single at each joint, and placed with the side against the rhachis. Glumes transverse (i. e. right and left), nearly equal and opposite, herbaceous, nerved. Lower palea very like the glumes, convex on the back, pointed or awned from the tip: the upper flattened, bristly-ciliate on the nerves, free, or adherent to the groove of the grain. Stamens 3. (The classical name, probably from *tritus*, beaten, because the grain is threshed out of the spikes.) — The true species are annuals, with the glumes ovate-oblong and ventricose-boat-shaped, as in common *Wheat* (T. VULGÀRE). Others are perennial, with nearly lanceolate acute or pointed glumes, and 2-ranked spikes, never furnishing bread-corn (§ AGROPÝRON, Gærtn.); to which the following belong.

1. **T. rèpens**, L. (COUCH-GRASS. QUITCH-GRASS. QUICK-GRASS.) *Rootstocks creeping* extensively; spikelets 4 – 8-flowered; glumes 5 – 7-nerved; rhachis glabrous, but rough on the angles; *awn none, or not more than half the length of the flower; leaves flat,* roughish or hairy above. — Var. NEMORÀLE, Anderson. Brighter green; paleæ pretty *long-awned;* spike slender. — Open grounds, northward: principally in meadows and cultivated grounds, where it is naturalized (from Europe) and very troublesome, multiplying rapidly and widely by its creeping slender rootstocks. June – Aug. (Eu.)

2. **T. canìnum**, L. (AWNED WHEAT-GRASS.) *No creeping rootstock;* spikelets 4 – 5-flowered; glumes 3 – 5-nerved; rhachis very rough; *awn longer than the smooth flower; leaves flat,* roughish. — Woods and banks, W. New York to Wisconsin, and northward. Also sparingly naturalized in fields. (Eu.)

3. **T. dasystàchyum.** Culm (1° – 3° high, from *a strong creeping rootstock*) and narrow mostly involute leaves *very smooth and glaucous; spikelets downy-hairy all over,* whitish, 5 – 9-flowered; glumes 5 – 7-nerved; rhachis rough on the edges; awn sometimes about half the length of the flower, sometimes nearly wanting. (T. repens, var. dasystachyum, *Hook.*) — Sandy shores of Lakes Huron and Superior, and northward. Aug.

44. HÓRDEUM, L. BARLEY.

Spikelets 1-flowered with an awl-shaped rudiment on the inner side, 3 at each joint of the rhachis; but the lateral ones usually imperfect or abortive, and short-stalked. Glumes side by side in front of the spikelets, 6 in number, forming a kind of involucre, slender and awn-pointed or bristle-form. Paleæ herbaceous, the lower (anterior) convex, long-awned from the apex. Stamens 3. Grain oblong, commonly adhering to the paleæ. Rhachis of the dense spike often separating into joints. (The ancient Latin name.)

1. **H. jubàtum,** L. (SQUIRREL-TAIL GRASS.) Low, lateral flowers abortive, neutral, on a short pedicel, short-awned; the perfect flower bearing an extremely *long awn* (2′ long) *about the length of the similar capillary glumes,* all spreading. ② — Marshes and moist sand of the sea-shore and the Northern lakes. June.

2. **H. pusillum,** Nutt. Lateral flowers imperfect and neutral, awnless but pointed, the perfect flower bearing an *awn nearly twice the length of its palea, equalling the short awns of the rigid glumes,* which rise, the central from an awl-shaped, the middle ones from an oblong base; spike linear. ① — Saline soil, Ohio, Illinois, and westward. — Too near H. maritimum of Europe. Culm 4′ - 10′ high.

H. DÍSTICHUM, L., is the cultivated TWO-ROWED BARLEY. H. VULGÀRE, L., is the common FOUR- (or SIX-) ROWED BARLEY; the lateral spikelets being also fertile, probably as a consequence of long-continued cultivation.

SECÀLE CEREÀLE, L., the RYE, is a well-known cultivated grain of this group, nearly allied to the Wheat in botanical character.

45. ÉLYMUS, L. LYME-GRASS. WILD RYE.

Spikelets 2 - 4 at each joint of the rhachis, all fertile and alike, sessile, each 1 - 7-flowered. Glumes conspicuous, nearly side by side in front of the spikelets, 2 for each spikelet, forming an involucre to the cluster. Paleæ coriaceous; the lower rounded on the back, acute or usually awned at the apex, adherent to the involving paleæ (whence the name, an ancient one for some grain, from ἐλύω, *to roll up*).

* *Glumes and lower paleæ rigid, both or only the latter awned: spikelets* 1 - 5-*flowered: perennials, with slender culms and rather harsh foliage.*

1. **E. Virgínicus,** L. *Spike rigidly upright, dense* and thick (3′ long), on a short *peduncle usually included in the sheath;* spikelets 2 - 3 together, 2 - 3-flowered, smooth, rather short-awned, about the length of the rough and thickened strongly-nerved and bristle-pointed *lanceolate glumes.* — River-banks; not rare. Aug. — Culm stout, 2° - 3° high: leaves broadly linear, rough.

2. **E. Canadénsis,** L. *Spike rather loose, curving* (5′ - 9′ long), on an exserted peduncle; spikelets mostly in pairs, of 3 - 5 long-awned rough or rough-hairy flowers; the *lance-awl-shaped glumes tipped with shorter awns.* (E. Philadelphicus, *L.!*) — Var. GLAUCIFÒLIUS (E. glaucifòlius, *Muhl.*) is pale or glaucous throughout, the flowers with more spreading awns (1½′ long). — River-banks, &c.; common.

3. **E. striàtus,** Willd. *Spike dense but slender,* upright or slightly nodding (3′–4′ long); spikelets mostly in pairs, 1–2- (or rarely 3-) flowered, minutely bristly-hairy; *glumes linear-awl-shaped or truly awl-shaped, bristle-awned, about thrice the length of the flowers,* not counting their capillary awn (which is 1′ long); leaves (rather narrow) and sheaths smooth or hairy, or downy. — Var. VILLÒSUS (E. villosus, *Muhl.!*) has a somewhat stouter spike and very hairy glumes. — Rocky woods and banks; rather rare. July. — The most slender and smallest-flowered species.

* * *Glumes and paleæ both awnless and soft in texture: reed-like perennials.*

4. **E. móllis,** Trin. (not of R. Br.) Stout (3° high); spike thick, erect (8′ long); spikelets 2 or 3 at each joint, 5–8-flowered; the lanceolate pointed 5–7-nerved glumes (1′ long) with the pointed paleæ soft-villous, the apex of the culm velvety; rhachis of the spikelets separating into joints. — Shore of Lakes Huron, Superior, and northward. (Near E. arenarius.)

46. GYMNÓSTICHUM, Schreb. BOTTLE-BRUSH GRASS.

Spikelets 2–3 (or sometimes solitary) on each joint of the rhachis, raised on a very short callous pedicel, loosely 2–4-flowered (when solitary placed flatwise on the rhachis). Glumes none! or small awn-like deciduous rudiments (whence the name of this genus [otherwise nearly as in Elymus], from γυμνός, *naked,* and στίχος, *a rank*).

1. **G. Hýstrix,** Schreb. Spike upright, loose (3′–6′ long); the spreading spikelets 2–3 together, early deciduous; flowers smoothish, or often rough-hairy, tipped with an awn thrice their length (1′ long); leaves and sheaths smoothish. ♃ (Elymus Hystrix, *L.*) — Moist woodlands; rather common. July.

47. AÌRA, L. (in part). HAIR-GRASS.

Spikelets 2-flowered, in an open diffuse panicle; the (small) flowers both perfect (sometimes with a third imperfect), usually shorter than the membranaceous keeled glumes, hairy at the base; the upper remotish. Lower palea truncate and mostly denticulate or eroded at the summit, bearing a slender bent or straight awn on its back. Stamens 3. Styles plumose to the base. Ovary glabrous. Grain oblong. (An ancient Greek name for Darnel.)

§ 1. DESCHÁMPSIA, Beauv., Trin. — *Lower palea thin and scarious or membranaceous, delicately 3–5-nerved, eroded or toothed at the truncate summit; the awn attached mostly a little above the base: grain not grooved, mostly free: glumes about equalling the flowers.*

1. **A. flexuòsa,** L. (COMMON HAIR-GRASS.) Culms slender, nearly naked (1°–2° high), from the small tufts of *involute-bristle-form leaves* (1′–6′ long); branches of the small spreading panicle capillary; *awn about twice the length of the palea.* ♃ — Dry places; common. June. (Eu.)

2. **A. cæspitòsa,** L. Culms in close tufts (2°–4° high); *leaves flat, linear;* panicle pyramidal or oblong (6′ long); *awn barely equalling the palea.* ♃ — Shores of lakes and streams; not rare northward. June, July. (Eu.)

§ 2. **VAHLÒDEA**, Fries. — *Glumes more boat-shaped, longer than the flowers: lower palea of a firm or coriaceous texture, nerveless, the truncate-obtuse tip mostly entire; the awn borne at or above the middle: grain grooved, flattish, free.*

3. **A. atropurpùrea**, Wahl. Culms 8′ – 15′ high, weak; leaves flat or rather wide; panicle of few spreading branches; awn stout, twice the length of the paleæ. ♃ — Alpine tops of the White Mountains, and those of N. New York. August. (Eu.)

48. DANTHÒNIA, DC. Wild Oat-Grass.

Lower palea (oblong or ovate, rounded-cylindraceous, 7 – 9-nerved) bearing between the sharp-pointed or awn-like teeth of the tip an awn composed of the 3 middle nerves, which is flattish and spirally twisting at the base: otherwise nearly as in Avena. Glumes longer than the imbricated flowers. (Named for *Danthoine*, a French botanist.)

1. **D. spicàta**, Beauv. Culms tufted (1° – 2° high); leaves short, narrow and soon involute; sheaths bearded at the throat; panicle simple, raceme-like (2′ long); the few spikelets appressed, 7-flowered; lower palea broadly ovate, loosely hairy on the back, much longer than its lance-awl-shaped teeth. ♃ — Dry and sterile or rocky soil. July.

49. TRISÈTUM, Persoon. Trisetum.

Spikelets 2 – several-flowered, often in a contracted panicle; the lower palea compressed-keeled, of about the same membranaceous texture as the glumes, bearing a bent or flexuous (rarely twisted) awn below the sharply 2-toothed or 2-pointed apex (whence the name, from *tris*, three, and *seta*, a bristle): otherwise nearly as in Avena.

1. **T. subspicàtum**, Beauv., var. **mólle.** *Minutely soft-downy; panicle dense, much contracted*, oblong or linear (2′ – 3′ long); glumes about the length of the 2 – 3 smooth flowers; awn diverging, much exserted. (Avena mollis, *Michx.*) ♃ — Mountains and rocky river-banks, N. New England to Wisconsin, and northward; rare. July. — About 1° high: leaves flat, short. (Eu.)

2. **T. palústre**, Torr. *Smooth; panicle* rather long and narrow (5′ long), *loose, the branches capillary; spikelets flat* (3″ long); glumes shorter than the 2 smooth lanceolate flowers, of which the upper is on a slightly naked joint of the rhachis, and bears a slender spreading or bent awn next the short 2-pointed tip, while the *lower one is commonly awnless* or only mucronate-pointed. ♃ (Avena palustris, *Michx.* Aira pallens, *Muhl.*) — Low grounds, S. New York to Illinois, and southward. June. — Culm slender, 2° – 3° high: leaves flat, short. Spikelets yellowish-white, tinged with green.

50. AVÈNA, L. Oat.

Spikelets 2 – many-flowered, panicled; the flowers herbaceo-chartaceous, or becoming harder, of firmer texture than the large and mostly unequal glumes; the uppermost imperfect. Lower palea rounded on the back, mostly 5 – 11-nerved, bearing a long usually bent or twisted awn on the back or below the acutely 2-cleft tip, proceeding from the mid-nerve only. Stamens 3. Grain oblong-linear, grooved on one side, usually hairy, free, but invested by the upper palea. (The classical Latin name.)

§ 1. AVENÁSTRUM, Koch. — *Spikelets rather small, several-flowered; the flowers remotish; glumes 1- and 3-nerved; lower palea about 7-nerved: root perennial.*

1. **A. striàta,** Michx. Culms tufted, slender (1° – 2° high); leaves narrow; panicle simple, loose, drooping with age; the few 3 – 5-flowered spikelets on rough capillary pedicels, much longer than the very unequal purple glumes; lower palea with a short bearded tuft at the base, much longer than the ciliate-fringed upper one (½′ long), bearing a long straightish awn just below the tapering very sharply cuspidate 2-cleft tip. (Trisetum purpurascens, *Torr.*) — Rocky, shaded hills, N. New England, New York, and northward. June.

§ 2. AIRÓPSIS, Desv., Fries. — *Spikelets very small, of 2 closely approximate flowers, and with no rudiment of a third: glumes 1-nerved: lower palea obscurely 3 – 5-nerved: root annual.* (Forms a genus intermediate between Aira and Avena, here appended to the latter for convenience.)

2. **A.** PRÆCOX, Beauv. Dwarf (3′ – 4′ high), tufted; leaves short, bristle-shaped; branches of the small oblong panicle appressed; awn from below the middle of the flower. (Aira præcox, *L.*) — Sandy fields, New Jersey to Virginia: rare. (Nat. from Eu.)

A. SATÌVA, L., the COMMON OAT, belongs to the section with annual roots, and long, 7 – 9-nerved glumes.

51. ARRHENATHÈRUM, Beauv. OAT-GRASS.

Spikelets open-panicled, 2-flowered, with the rudiment of a third flower; the middle flower perfect, with its lower palea barely bristle-pointed from near the tip; the lowest flower staminate only, bearing a long bent awn below the middle of the back (whence the name, from ἄῤῥην, *masculine*, and ἀθήρ, *awn*): — otherwise as in Avena, of which it is only a peculiar modification.

1. **A.** AVENÀCEUM, Beauv. Leaves broad, flat; panicle elongated (8′ – 10′ long); glumes scarious, very unequal. ♃ (Avena elatior, *L.*) — Meadows and lots; scarce: absurdly called *Grass of the Andes*. May – July. (Nat. from Eu.)

52. HÓLCUS, L. (partly). MEADOW SOFT-GRASS.

Spikelets crowded in an open panicle, 2-flowered, jointed with the pedicels; the boat-shaped membranaceous glumes enclosing and much exceeding the remotish flowers. Lower flower perfect, but its papery or thin-coriaceous lower palea awnless and pointless; the upper flower staminate only, otherwise similar, but bearing a stout bent awn below the apex. Stamens 3. Styles plumose to the base. Grain free, scarcely grooved. (An ancient name, from ὁλκός, *draught*, of obscure application.)

1. **H.** LANÀTUS, L. (VELVET-GRASS.) Soft-downy, pale; panicle oblong (1′ – 4′ long); upper glume mucronate-awned under the apex; awn of the staminate flower recurved. ♃ — Moist meadows; scarce. June. (Nat. from Eu.)

53. HIERÓCHLOA, Gmelin. HOLY-GRASS.

Spikelets plainly 3-flowered, open-panicled; the flowers all with 2 paleæ the two lower (lateral) flowers staminate only, 3-androus, sessile, often awned on the middle of the back or near the tip; the uppermost (middle) one perfect, short-pedicelled, scarcely as long as the others, 2-androus, awnless. Glumes equalling or exceeding the spikelet, scarious; paleæ chartaceous. — Leaves linear or lanceolate, flat. (Name composed of *ἱερός*, *sacred*, and *χλόα*, *grass*; these sweet-scented Grasses being strewn before the church-doors on saints' days, in the North of Europe.)

1. **H. boreàlis,** Roem. & Schultes. (VANILLA or SENECA GRASS.) Panicle somewhat one-sided, pyramidal (2′–5′ long); peduncles smooth; staminate flowers with the lower palea mucronate or bristle-pointed at or near the tip; rootstock creeping. ♃ (Holcus odoratus, *L.*) — Moist meadows, Mass. to Wisconsin, and northward, chiefly near the coast and along the Lakes. May. — Culm 1°–2° high, with short lanceolate leaves. Spikelets chestnut-color; the sterile flowers strongly hairy-fringed on the margins, and the fertile one at the tip. (Eu.)

2. **H. alpina,** Roem. & Schultes. Panicle contracted (1′–2′ long); one of the staminate flowers barely pointed or short-awned near the tip, the other long-awned from below the middle; lowest leaves very narrow. ♃ — Alpine mountain-tops, New England, New York, and northward. July. (Eu.)

54. ANTHOXÁNTHUM, L. SWEET-SCENTED VERNAL-GRASS.

Spikelets spiked-panicled, 3-flowered; but the lateral flowers neutral, consisting merely of one palea which is hairy on the outside and awned on the back: the central (terminal) flower perfect, of 2 awnless chartaceous paleæ, 2-androus. Glumes very thin, acute, keeled; the upper about as long as the flowers, twice the length of the lower. Squamulæ none. Grain ovate, adherent to the enclosing paleæ. (Name compounded of *ἄνθος*, *flower*, and *ἄνθων*, *of flowers*. *L.*)

1. **A. ODORÀTUM**, L. Spikelets spreading (brownish or tinged with green); one of the neutral flowers bearing a bent awn from near its base, the other short-awned below the tip. ♃ — Meadows, pastures, &c.; very sweet-scented in drying. May–July. (Nat. from Eu.)

55. PHÁLARIS, L. CANARY-GRASS.

Spikelets crowded in a dense or spiked panicle, with 2 neutral mere rudiments of a flower, one on each side, at the base of the perfect one, which is flattish, awnless, of 2 shining paleæ, shorter than the equal boat-shaped and often winged-keeled glumes, finally coriaceous or cartilaginous, and closely enclosing the flattened free and smooth grain. Stamens 3. — Leaves broad, flat. (The ancient name, from *φαλός*, *shining*, alluding either to the paleæ or the grain.)

1. **P. arundinàcea,** L. (REED CANARY-GRASS.) Panicle more or less branched, clustered, a little spreading when old; *glumes wingless*, with flattened pointed tips; *rudimentary flowers hairy*, ¼ the length of the fertile one. ♃

(P. Americana, *Torr.*, not of *Ell.* Digraphis arundinacea, *Trin.*) — Wet grounds; very common northward. July. — Culm 2° - 4° high. Leaves 3″ - 5″ wide. — The RIBBON-GRASS of the gardens is a state of this species, with variegated leaves. (Eu.)

2. **P. Canariénsis**, L. (CANARY-GRASS.) Panicle spiked, oval; *glumes wing-keeled; rudimentary flowers smooth*, half the length of the perfect one. ① — Waste places, near New York (*Torrey*), and sparingly cultivated. July - Sept. — It yields the *Canary-seed.* (Adv. from Eu.)

56. MÍLIUM, MILLET-GRASS.

Spikelets diffusely panicled, not jointed with their pedicels, apparently consisting of 2 equal membranaceous convex and awnless glumes, including a single coriaceous awnless flower: but theoretically the lower glume is wanting, while an empty single palea of the lower (neutral) flower, resembling the upper glume, fulfils its office, and stands opposite the narrow upper palea of the terete fertile flower. Stamens 3. Stigmas branched-plumose. Grain not grooved, enclosed in the paleæ, all deciduous together. (The ancient Latin name of the Millet (which however belongs to a different genus), probably from *mille*, a thousand, because of its fertility.)

1. **M. effúsum**, L. Smooth (3° - 6° high); leaves broad and flat, thin, panicle spreading (6′ - 9′ long); flower ovoid-oblong. ♃ — Cold woods; common northward. June. (Eu.)

57. AMPHICÁRPUM, Kunth. (MILIUM, *Pursh.*)

Spikelets jointed with the apex of the pedicels, apparently 1-flowered, of two kinds; one kind in a strict terminal panicle, like those of Milium, except that the rudiment of the lower glume is ordinarily discernible, quite deciduous from the joint, commonly without ripening fruit, although the flower is perfect: the other kind solitary at the extremity of slender runner-like radical peduncles (which are more or less sheathed towards the base), much larger than the others, perfect and fertile, subterranean; the enwrapping glume and similar empty palea many-nerved. Flower oblong or ovoid, pointed. Stamens 3 (small in the radical flowers). Stigmas plumose, deep purple. Grain ovoid, terete, not grooved, in the radical flowers very large (2″ - 3″ long), the embryo next the lower palea. Neutral palea somewhat exceeding the glume and the fertile flower. — Leaves lanceolate, flat, copious on the lower part of the culm, clothed like the sheaths with spreading bristly hairs. (Name from ἀμφίκαρπος, *doubly fruit-bearing.*)

1. **A. Púrshii**, Kunth. (Milium amphicarpon, *Pursh.*) — Moist sandy pine barrens, New Jersey. Sept.

58. PÁSPALUM, L. PASPALUM.

Spikelets spiked or somewhat racemed in 2 - 4 rows on one side of a flattened or filiform continuous rhachis, jointed with their very short pedicels, plano-convex, awnless, apparently only one-flowered, as in Milium; but, on the other hand, differing from Panicum merely in the want of the lower glume; which, however, is occasionally present in some species, as a small scale. Glume and empty palea few-nerved. Flower coriaceous, mostly orbicular or ovate, flat on the inner side, convex on the outer. Stamens 3. — (Said to have been a Greek name for Millet.)

* *Spikes very numerous in a spiked raceme; their thin and membranaceous or foliaceous rhachis broader than the spikelets, and keeled or boat-shaped.*

1. **P. flùitans,** Kunth. Glabrous; stems procumbent below and rooting in the mud or floating; leaves lanceolate; rhachis (1″ wide) projecting beyond the small slightly pubescent spikelets into a tapering point, scabrous on the back. ① (Ceresia fluitans, *Ell.*) — River-swamps, Virginia, S. Ohio, Illinois, and southward. Oct.

* * *Spikes one or few; the rhachis narrower than the spikelets.*

+ *Spikelets very obtuse, orbicular: spikes one terminal, and often 1-5 lateral.*

2. **P. setàceum,** Michx. Culm ascending or decumbent (1°-2° long), slender; leaves (2″ wide, flat) and sheaths clothed with soft spreading hairs; *spikes very slender* (2′-4′ long), smooth, *mostly solitary on a long peduncle, and usually one from the sheaths of each of the upper leaves on short peduncles or included; spikelets* (½″ wide) *narrowly 2-rowed.* ♃ (Also P. debile and P. ciliatifolium, *Michx.*) — Sandy fields, Massachusetts, near the coast, to Illinois, and southward. August.

3. **P. læve,** Michx. Culm upright, rather stout (1°-3° high); the pretty large and long leaves with the flattened sheaths smooth or somewhat hairy; *spikes* 2-6, the lateral ones somewhat approximated near *the summit of an elongated naked peduncle,* spreading (2′-4′ long), smooth, except a bearded tuft at their base; *spikelets broadly 2-rowed* (over 1″ wide). ♃ ? — Moist soil, S. New England to Kentucky, and southward. August. — Either glabrous or sometimes the lower sheaths, &c. very hairy.

+ + *Spikelets acute: spikes always a pair at the summit of the naked peduncle.*

4. **P. distichum,** L. (Joint-Grass.) Nearly glabrous, rather glaucous; culms ascending (about 1° high) from a long creeping base; leaves linear-lanceolate (2′-3′ long); *spikes short* and closely-flowered (¾′-2′ long), *one short-peduncled, the other sessile;* rhachis flat on the back; *spikelets ovate, slightly pointed* (barely 1½″ long). ♃ (P. notatum, *Fluegge, &c.*) — Wet fields, Virginia and southward. July-Sept.

5. **P. Digitària,** Poir. Culms ascending (1°-2½° high) from a creeping base; leaves lanceolate (3′-6′ long, ¼′-½′ wide); *spikes slender* and rather sparsely flowered (1′-4′ long), *conjugate, both sessile* at the apex of the slender peduncle; *spikelets ovate-lanceolate* (2″ long). (Milium paspalodes, *Ell.*) — Virginia (*Pursh*), and southward.

59. PÁNICUM, L. Panic-Grass.

Spikelets panicled, racemed, or sometimes spiked, not involucrate, 1½-2-flowered. Glumes 2, but the lower one usually short or minute (rarely wanting), membranaceo-herbaceous; the upper as long as the fertile flower. Lower flower either neutral or staminate, of one palea which closely resembles the upper glume, and sometimes with a second thin one. Upper flower perfect, closed, coriaceous or cartilaginous, usually flattish parallel with the glumes, awnless, enclosing the free and grooveless grain. Stamens 3. Stigmas plumose, usually purple. (An ancient Latin name of the Italian Millet, *P. Italicum* (now Setaria Italica), thought to come from *panis*, bread; some species furnishing a kind of bread-corn.)

§ 1. DIGITÀRIA, Scop. — *Spikelets crowded 2 – 3 together in simple and mostly 1-sided clustered spikes or spike-like racemes, wholly awnless and pointless: lower flower neutral, of a single palea: lower glume minute, sometimes obsolete or wanting: root annual: plant often purplish.*

* *Spikes erect; the rhachis filiform, nearly terete.*

1. **P. filifórme,** L. Culms very slender (1° – 2° high), upright; lower sheaths hairy; *spikes* 2 – 8, alternate and approximated, filiform; spikelets oblong, acute (½″ long); upper glume equalling the flower, the lower almost wanting. — Dry sandy soil, Massachusetts to New Jersey along the coast, Illinois, and southward. Aug.

* * *Spikes spreading; the rhachis flat and thin.*

2. **P.** GLÀBRUM, Gaudin. Culms spreading, prostrate, or sometimes erect (5′ – 12′ long), glabrous; *spikes* 2 – 6, *widely diverging*, nearly digitate; spikelets ovoid (about 1″ long); *upper glume equalling the flower, the lower one almost wanting.* — Cultivated grounds and waste places; common southward, and not rare northward: in some places appearing as if indigenous, but probably an introduced plant. Aug., Sept. (Nat. from Eu.)

3. **P.** SANGUINÀLE, L. (COMMON CRAB-GRASS. FINGER-GRASS.) Culms erect or spreading (1° – 2° high); leaves and sheaths glabrous or hairy; *spikes* 4 – 15, *spreading*, digitate; spikelets oblong (1½″ long); *upper glume half the length of the flower, the lower one small.* — Cultivated and waste grounds, and yards; common. (Nat. from Eu.)

§ 2. PANICUM PROPER. — *Spikelets scattered, in panicles, awnless.*

* *Panicle elongated and racemose, wand-like or pyramidal; the numerous and usually pointed spikelets short-pedicelled, excepting No. 7.*

+ *Sterile flower neutral, fully twice the length of the lower glume: spikelets small (not more than 1″ or 1½″ long).*

++ *Neutral flower consisting of 2 paleæ.*

4. **P. ánceps,** Michx. *Culms flat, upright* (2° – 4° high); leaves rather broadly linear (1° – 2° long, 4″ – 5″ wide), smooth; panicle contracted-pyramidal; *spikelets ovate-lanceolate, pointed,* a little curved; *upper glume 7-nerved;* neutral flower ⅓ longer than the perfect one. ♃ — Wet soil, pine barrens of New Jersey to Virginia, and southward. Aug. — Allied to the next: spikelets and branches of the panicle longer.

5. **P. agrostoìdes,** Spreng. *Culms flattened, upright* (2° high); leaves long, and with the sheaths smooth; panicles terminal and often lateral, pyramidal (4′ – 8′ long); the *spikelets* racemose, crowded and one-sided on the spreading branches, *ovate-oblong, acute* (purplish); *upper glume 5-nerved,* longer than the

neutral flower, which exceeds the perfect one. (P. agrostidiforme, *Lam.?* P. multiflorum, *Poir.*) — Wet meadows, E. Massachusetts to Virginia, Illinois, and southward. Aug.

↠ ↠ *Neutral flower consisting of a single palea.*

6. **P. prolíferum,** Lam. *Smooth* throughout; *culms thickened, succulent, branched and geniculate, ascending* from a procumbent base; sheaths flattened; ligule ciliate; panicles terminal and lateral, compound, pyramidal, the slender primary branches at length spreading; *spikelets appressed, lance-oval,* acute (pale green), lower glume broad, ⅓ to ½ the length of the upper; *neutral flower little longer than the perfect one.* ① — Brackish marshes and meadows; common along the coast from Massachusetts southward: also along the Ohio and Mississippi. Aug.

7. **P. capillàre,** L. *Culm upright,* often branched at the base and forming a tuft; leaves (large) and especially the flattened *sheaths very hirsute; panicle pyramidal, capillary, compound and very loose* (6′ – 12′ long), the slender straight branches somewhat reflexed when old; *spikelets scattered on long pedicels, oblong-ovoid and pointed;* lower glume half the length of the neutral palea, which is longer than the *ovoid-oblong obtuse perfect flower.* ① — Sandy soil and cultivated fields everywhere. Aug., Sept.

8. **P. autumnàle,** Bosc! *Culm ascending, very slender* (1° high), branching below; *leaves small* (1′ – 2′ long, linear-lanceolate) *and upper sheaths glabrous;* panicle as in depauperate states of the last, but glabrous, except the *strongly bearded main axis,* its capillary much elongated divisions mostly simple and bearing solitary *spindle-shaped spikelets;* lower glume minute; *perfect flower narrowly oblong or lance-oblong, acute,* nearly equalling the lance-oblong obtusish upper glume and the neutral palea. ♃ ? (P. dichotomiflorum, *Michx.* ?) — Sand-hills, Mason County, Illinois (*Mead*), and southward. — This well-marked species is either rare, or has been generally overlooked.

+ + *Sterile flower staminate, of 2 paleæ; lower glume nearly equalling it: spikelets large* (2″ – 2½″ *long*).

9. **P. virgàtum,** L. Very smooth; culms upright (3° – 5° high); *leaves very long, flat; branches of the compound loose and large panicle* (9′ – 2° long) *at length spreading or drooping;* spikelets scattered, oval, pointed; glumes and sterile paleæ pointed, usually purplish. ♃ — Moist sandy soil; common, especially southward. Aug.

10. **P. amàrum,** Ell. Nearly smooth, rigid; culms (1½° high) sheathed to the top; *leaves involute, glaucous, coriaceous, the uppermost exceeding the contracted panicle,* the simple racemose branches of which are appressed, very smooth; spikelets ovate, pointed (pale); lower glume little shorter than the sterile flower. ♃ — Sandy shores, Connecticut (*Barratt, Robbins*), Virginia, and southward. Aug., Sept.

* * *Panicle loosely spreading or diffuse, short.*

+ *Lower* (*sterile*) *flower formed of 2 paleæ* (*the upper one scarious and sometimes small and inconspicuous*), *neutral, except in No.* 11, *and occasionally in No.* 14, *where it is staminate.*

↔ *Culm-leaves broadly lanceolate or wider, with 9 – 15 principal nerves.*

11. **P. latifòlium,** L. (excl. syn. Sloane, &c.) Culm (1° – 2° high), smooth; the joints and the orifice of the throat or margins of the otherwise *smooth sheaths often bearded with soft woolly hairs; leaves broadly oblong-lanceolate from a heart-clasping base* (often 1′ wide), taper-pointed, 11 – 15-nerved, smooth, or sparingly downy-hairy; panicle more or less exserted (2′ – 3′ long), usually long-peduncled, the branches spreading; *spikelets obovate, 1½″ long*, downy; lower glume ovate, not half the length of the many-nerved upper one; sterile flower often (but not always) with 3 stamens. ♃ (P. Walteri, *Poir.*) — Moist thickets; common. June – Aug.

12. **P. clandestìnum,** L. Culm rigid (1° – 3° high), very leafy to the top, at length producing appressed branches, the *joints naked; sheaths rough with papillæ bearing very stiff and spreading bristly hairs;* leaves oblong-lanceolate from a heart-clasping base, very taper-pointed; lateral panicles and usually also the terminal *panicle more or less enclosed in the sheaths*, or, in var. PEDUNCULATUM (P. pedunculatum, *Torr.*), with the terminal one at length long-peduncled: — otherwise resembling No. 11; but the *spikelets more ovoid*, often smooth; the lower flower (always?) neutral. — Low thickets and river-banks; rather common. July – Sept.

13. **P. microcárpon,** Muhl. Culm and sheaths as in No. 11; the broadly lanceolate leaves nearly similar, but longer in proportion and less pointed, not dilated at the rounded bristly-ciliate base, very rough-margined, the upper surface roughish; panicle soon exserted on a slender peduncle, very many-flowered, narrowly oblong (3′ – 7′ long); spikelets about ½″ long, ovoid, smooth or smoothish; lower glume orbicular and very small. ♃ (P. multiflorum, *Ell.*? not of *Poir.*) — Dry or moist thickets, Pennsylvania and Michigan to Illinois, and southward. July – Sept.

14. **P. xanthophỳsum,** Gray. Culm simple, or at length branched near the base (9′ – 15′ high); *sheaths hairy; leaves lanceolate, very acute* (4′ – 6′ long by ½′ wide), *not dilated at the ciliate-bearded clasping base, smooth* except the margins, *strongly* 9 – 11-*nerved; panicle long-peduncled, simple, contracted*, the appressed branches bearing few *roundish-obovate spikelets* (*about* 1½″ *long*); lower glume ovate, acutish, one third or half the length of the 9-nerved upper one. ♃ — Dry and sandy soil, Maine to Wisconsin, and northward; rare. June. — Plant yellowish-green: spikelets minutely downy: sterile flower sometimes staminate.

15. **P. viscidum,** Ell. Culms upright or ascending, at length much branched, leafy to the top, *densely velvety-downy all over, as also the sheaths*, with reflexed soft and often clammy hairs, *except a ring below each joint; leaves likewise velvety all over, lanceolate* (½′ *wide*), 11 – 13-*nerved;* panicles spreading, the lateral ones included; *spikelets obovate,* 1″ or 1½″ *long*, downy; the roundish lower glume scarcely one fourth the length of the 7-nerved upper one. — Damp soil, S. New Jersey to Virginia, and southward. Aug.

16. **P. pauciflòrum,** Ell.? *Culms* upright, at length much branched and reclining (1° – 2° long), *roughish; leaves lanceolate* (3′ – 5′ long by ¼′ – ½′ wide), *rather faintly* 9-*nerved*, hairy or smooth, *fringed* on the whole margin or next the

base *with long and stiff spreading hairs, the sheaths bristly throughout* with similar hairs; *panicle open, nearly simple, bearing few* tumid-obovate hairy or smoothish *spikelets about* 1½″ *long;* lower glume roundish, about half or a quarter of the length of the upper one. (P. leucoblepharis, *Trin.?*) — Wet meadows and copses, W. New York to Wisconsin, and southward. June, July. — Distinguished by its much larger spikelets, more nerved leaves, and coarser aspect, from any form of the next. It has probably been described under several names, some of them earlier than Elliott's.

++ ++ *Leaves linear or lanceolate, with few or indistinct primary nerves.*

17. **P. dichótomum,** L.! Culms (8′ – 20′ high) at first mostly simple, bearing a more or less exserted *spreading compound panicle* (1′ – 3′ long), and *lanceolate flat leaves* (those tufted at the root usually ovate-lanceolate and very short, thickish); but commonly branching later in the season, the branches often clustered, and bearing nearly simple and included small panicles; *spikelets* ½″ *to about* 1″ *long;* oblong-obovate, downy or smooth; *lower glume roundish, one third or a quarter the length of the* 5 – 7*-nerved upper one.* — Founded on an autumnal state of the species, much forked and with densely clustered lateral branchlets and panicles. (P. nodiflorum, *Lam.*) — Exhibits an interminable diversity of forms; of which a shaggy-hairy and larger-flowered variety is P. pubescens, *Lam.;* and one with smaller spikelets is P. laxiflorum, *Lam.;* while the varied smooth or smoothish states with shining leaves are P. nitidum, *Lam.*, and (the more slender forms) P. barbulatum, *Michx.*, P. ramulosum, *Michx.*, *&c.* — Dry or low grounds; everywhere common, especially southward. June – Aug. — Some of these species are likely to be revived; but if distinct, I am wholly unable to limit them.

18. **P. depauperàtum,** Muhl. Culms simple or branched from the base, forming close tufts (6′ – 12′ high), terminated by a *simple and few-flowered contracted panicle, often much overtopped by the narrowly linear and elongated* (4′ – 7′) *upper leaves; spikelets* ¾″ – 1½″ *long,* oval-obovate, commonly pointed when young; the ovate *lower one third the length of the* 9*-nerved upper one.* ♃ (P. strictum, *Pursh.* P. rectum, *Ræm. & Schult.*) — Varies, with the leaves involute, at least when dry (P. involutum, *Torr.*), and with the sheaths either beset with long hairs or nearly smooth: the panicle either partly included, or oftener on a long and slender peduncle. — Dry woods and hills; rather common, especially northward. June.

+ + *Lower flower destitute of an upper palea, and neutral.*

19. **P. verrucòsum,** Muhl. Smooth; culms branching and spreading, very slender (1° – 2° long), naked above; leaves linear-lanceolate (2″ – 3 wide), shining; branches of the diffuse panicle capillary, few-flowered; *spikelets oval, acute,* ¾″ *long, warty-roughened* (dark green); the lower glume one fourth the length of the obscurely nerved upper one. ① ? — Sandy swamps, New England to Virginia, near the coast, and southward. Aug.

§ 3. ECHINÓCHLOA, Beauv. — *Spikelets imbricated-spiked on the branches of the simple or compound raceme or panicle, rough with appressed stiff hairs: lower palea of the sterile flower awl-pointed or awned.*

20. **P.** CRUS-GÁLLI, L. (BARNYARD-GRASS.) Culms stout, branching

from the base (1°–4° high); leaves lanceolate (½′ or more wide), rough-margined, otherwise with the sheaths smooth; spikes alternate (1′–3′ long), crowded in a dense panicle; glumes ovate, abruptly pointed; lower palea of the neutral flower bearing a rough awn of variable length. ① — Varies greatly; sometimes awnless or nearly so; sometimes long-awned, especially so in var. HÍSPIDUM (P. hispidum, *Muhl.*, P. longisetum, *Torr.*), a very large and coarse form of the species, which has the sheaths of the leaves very bristly. — Moist and chiefly manured soil: the variety in ditches, usually near salt water; possibly indigenous. Aug. – Oct. (Nat. from Eu.?)

60. SETÀRIA, Beauv. BRISTLY FOXTAIL-GRASS.

Spikelets altogether as in Panicum proper, and awnless, but with the short peduncles produced beyond them into solitary or clustered bristles resembling awns (not forming a real involucre). Inflorescence a dense spiked panicle, or apparently a cylindrical spike. — Annuals, in cultivated grounds, with linear or lanceolate flat leaves: properly to be regarded as a subgenus of Panicum. (Name from *seta*, a bristle.)

* *Bristles single or in pairs, roughened or barbed downwards.*

1. **S.** VERTICILLÀTA, Beauv. Spike cylindrical (2′–3′ long, pale green), somewhat interrupted, composed of apparently whorled short clusters; bristles short, adhesive. (Panicum verticillatum, *L.*) — Near dwellings: rare northward. (Adv. from Eu.)

* * *Bristles in clusters, roughened or barbed upwards.*

2. **S.** GLAÙCA, Beauv. (FOXTAIL.) *Spike cylindrical, very dense, tawny yellow* (2′–4′ long); *bristles* 6–11 *in a cluster,* much longer than the spikelets; *perfect flower transversely wrinkled.* — Very common in stubble, barn-yards, &c. (Adv. from Eu.)

3. **S.** VÍRIDIS, Beauv. (GREEN FOXTAIL. BOTTLE-GRASS.) *Spike nearly cylindrical, more or less compound, green; bristles few in a cluster,* longer than the spikelets; *perfect flower striate lengthwise and dotted.* — Common in cultivated grounds. (Adv. from Eu.)

4. **S.** ITÁLICA, Kunth. *Spike compound,* interrupted at the base, thick, *nodding* (6′–9′ long, *yellowish or purplish*); *bristles* 2 *or* 3 *in a cluster,* either much longer or else shorter than the spikelets. — S. Germanica, *Beauv.* is a variety. Sometimes cultivated under the name of MILLET, or BENGAL GRASS: rarely spontaneous. (Adv. from Eu.)

61. CÉNCHRUS, L. HEDGEHOG- or BUR-GRASS.

Spikelets as in Panicum, awnless, but enclosed 1 to 5 together in a globular and bristly or spiny involucre, which becomes coriaceous and forms a deciduous hard and rigid bur: the involucres sessile in a terminal spike. Styles united below. (An ancient Greek name of Setaria Italica, transferred, for no evident reason, to this genus.)

1. **C. tribuloides,** L. Culms branched at the base, ascending (1°–2° long); leaves flat; spike oblong, composed of 8–10 spherical heads; involucre prickly all over with spreading and downwardly barbed short spines, more or

less downy, enclosing 2 or 3 spikelets. ① — Sandy soil, on the coast, and along the Great Lakes; ascending the larger rivers for some distance. Aug. — A vile weed.

62. TRÍPSACUM, L. GAMA-GRASS. SESAME-GRASS.

Spikelets monœcious, in jointed spikes, which are staminate above and fertile below. Staminate spikelets 2, sessile at each triangular joint of the narrow rhachis, forming a 1-sided and 2-ranked spike longer than the joints, both alike, 2-flowered: glumes coriaceous, the lower one (outer) nerved, the inner one boat-shaped: paleæ very thin and membranaceous, awnless: anthers (turning orange or reddish-brown) opening by 2 pores at the apex. Pistillate spikelets single and deeply imbedded in each oblong joint of the cartilaginous thickened rhachis, occupying a boat-shaped recess which is closed by the polished and cartilaginous ovate outer glume; the inner glume much thinner, pointed, 2-flowered; the lower flower neutral; the paleæ very thin and scarious, crowded together, pointless. Styles united: stigmas very long (purple), hispid. Grain ovoid, free. Culms stout and tall, solid, from very thick creeping rootstocks. Leaves broad and flat. Spikes axillary and terminal, separating spontaneously into joints at maturity. (Name from *τρίβω, to rub*, perhaps in allusion to the polished fertile spike.)

1. **T. dactyloides,** L. Spikes (4′–8′ long) 2–3 together at the summit (when their contiguous sides are more or less flattened), and also solitary from some of the upper sheaths (when the fertile part is cylindrical); sometimes, var. MONOSTÁCHYUM, the terminal spike also solitary. — Moist soil, Connecticut to Pennsylvania, near the coast, thence west to Illinois, and southward. Aug. — Culm 4°–7° high: the leaves like those of Indian Corn. — This is one of our largest and most remarkable Grasses. It is sometimes used for fodder at the South, where better is not to be had.

63. ERIÁNTHUS, Michx. WOOLLY BEARD-GRASS.

Spikelets spiked in pairs upon each joint of the slender rhachis; one of them sessile, the other pedicelled; otherwise both alike; with the lower flower neutral, of one membranaceous palea; the upper perfect, of 2 hyaline paleæ, which are thinner and shorter than the nearly equal membranaceous glumes, the lower awned from the tip. Stamens 1–3. Grain free. — Tall and stout reed-like Grasses, with the spikes crowded in a panicle, and clothed with long silky hairs, especially in a tuft around the base of each spikelet (whence the name, from *ἔριον, wool*, and *ἄνθος, flower*).

1. **E. alopecuroides,** Ell. Culm (4°–6° high) woolly-bearded at the joints; *panicle contracted; the silky hairs longer than the spikelets,* shorter than the straight awn; or at length contorted; stamens 2. ♃ — Wet pine barrens, New Jersey, Illinois, and southward: rare. Sept., Oct.

2. **E. brevibárbis,** Michx. Culm (2°–5° high), somewhat bearded at the upper joints; *panicle rather open;* silky hairs shorter than the spikelets. ♃ — Low grounds, Virginia and southward.

64. ANDROPÒGON, L. BEARD-GRASS.

Spikelets in pairs upon each joint of the slender rhachis, spiked or racemed; one of them pedicelled and sterile, often a mere vestige: the other sessile, with the lower flower neutral and of a single palea; the upper perfect and fertile, of 2 thin and hyaline paleæ shorter than the herbaceous or chartaceous glumes, the lower awned from the tip. Stamens 1–3. Grain free. — Coarse and mostly rigid perennial Grasses, with lateral or terminal spikes commonly clustered or digitate; the rhachis hairy or plumose-bearded, and often the sterile or staminate flowers also (whence the name, composed of ἀνήρ, ἄνδρος, *man*, and πώγων, *beard*).

* *Sterile spikelet staminate (stamens 3), awnless: spikes digitate.*

1. **A. furcàtus,** Muhl. Culms (4° high) and leaves nearly smooth, bearing 3–5 straight and rather rigid hairy spikes together at the naked summit (or fewer on lateral branches); spikelets approximated, roughish-downy; awn bent. — Sterile soil; common. Sept.

* * *Sterile spikelet neutral, reduced to a small pointed glume raised on a long bearded pedicel; the fertile 2–3-androus, bearing a slender mostly bent or twisted awn: culms paniculate-branched.*

2. **A. scopàrius,** Michx. Culms slender (2°–4° high), with many paniculate branches; the lower sheaths and the narrow leaves hairy; *spikes mostly single,* terminating the short branches, peduncled, *very loose, slender* (2′ long, often purple), *sparsely silky with dull white hairs;* the zigzag rhachis hairy along the edges; pairs of spikelets rather distant. — Sterile or open sandy soil; common July–Sept.

3. **A. argénteus,** Ell. Culms rather slender (about 3° high); *spikes in pairs,* on a peduncle exceeding the sheaths, *dense, very silky with long white hairs* (1½′–2′ long); rudimentary flower much shorter than the hairs of its pedicel. — Sterile soil, Virginia, Illinois? and southward. Sept., Oct. — Spikes much denser, and the flowers larger and more silky, than in the next; which it considerably resembles.

* * * *Sterile spikelet abortive, reduced to a mere awn-like plumose pedicel, bearing no distinct rudiment of a flower; the fertile 1-androus, and bearing a straight slender awn: spikes clustered, lateral and terminal, partly enclosed in the flattened bract-like sheaths; the slender rhachis, &c. clothed with copious very long and silky (white) hairs.*

4. **A. Virgínicus,** L. Culm flattish below, slender, *sparingly short-branched above* (3° high); sheaths smooth; *spikes 2 or 3 together in distant appressed clusters, weak and soft* (1′ long). — Sandy soil; New York to Illinois, and southward. Sept.

5. **A. macroùrus,** Michx. Culm stout (2°–3° high), *bushy-branched at the summit,* loaded with numerous *spikes forming dense leafy clusters;* sheaths rough, the upper hairy. — Low grounds, New York to Virginia, near the coast, and southward. Sept., Oct.

65. SÓRGHUM, Pers. BROOM-CORN.

Spikelets 2–3 together on the ramifications of an open panicle, the lateral ones sterile or often reduced merely to their pedicels; only the middle or terminal one fertile, its glumes coriaceous or indurated, sometimes awnless: otherwise nearly as in Andropogon. Stamens 3. (The Asiatic name of a cultivated species.)

1. **S. nùtans.** (INDIAN GRASS. WOOD-GRASS.) Culm simple (3°–5° high), terete; leaves linear-lanceolate, glaucous; sheaths smooth; panicle narrowly oblong, rather crowded (6′–12′ long); the perfect spikelets at length drooping (light russet-brown and shining), clothed, especially towards the base, with fawn-colored hairs, lanceolate, shorter than the twisted awn; the sterile spikelets small and imperfect, deciduous, or reduced to a mere plumose-hairy pedicel. ♃ (Andropogon nutans, *L.*) — Dry soil; common, especially southward, where it exhibits several more or less marked varieties. Aug.

S. VULGÀRE, Pers., the INDIAN MILLET, has several cultivated varieties or races, such as the GUINEA-CORN and BROOM-CORN.

ZEA MAYS, the INDIAN CORN, is a well-known Paniceous Grass.

SACCHARUM OFFICINARUM, L., the SUGAR-CANE, is a tropical Grass, closely allied to Erianthus, p. 582.

SERIES II.

CRYPTÓGAMOUS OR FLOWERLESS PLANTS.

Vegetables destitute of proper flowers (stamens and pistils), and producing, in place of seeds, minute bodies of homogeneous structure (called *spores*), in which there is no embryo, or plantlet anterior to germination.

Class III. ÁCROGENS.

Cryptogamous plants with a distinct axis (stem and branches), growing from the apex only, containing woody fibre and vessels (especially ducts), and usually with distinct foliage.

Order 135. EQUISETÀCEÆ. (Horsetail Family.)

Leafless plants, with rush-like hollow and jointed stems, arising from running rootstocks, terminated by the fructification in the form of a cone or spike, which is composed of shield-shaped stalked scales bearing the spore-cases underneath. — Comprises solely the genus

1. EQUISÈTUM, L. Horsetail. Scouring Rush. (Tab. 14.)

Spore-cases (*sporangia, thecæ*) 6 or 7, adhering to the under side of the angled shield-shaped scales of the spike, 1-celled, opening down the inner side and discharging the numerous loose spores. To the base of each spore are attached 4 thread-like and club-shaped elastic filaments (*elaters*), which roll up closely around them when moist, and uncoil when dry. — Stems striate-grooved, rigid, the hard cuticle abounding in silex, hollow, and also with an outer circle of smaller air-cavities corresponding with the grooves; the joints closed and solid, each bearing instead of leaves a sheath, which surrounds the base of the internode above, and is split into teeth corresponding in number and position with the principal ridges of the stem: the stomata always occupying the principal grooves. Branches, when present, in whorls from the base of the sheath, like the stem, but without the central air-cavity. (The ancient name, from *equus*, horse, and *seta*, bristle.)

* *Stems annual (not surviving the winter): fructification in spring (April and May). (Stomata irregularly scattered over the whole surface of the grooves.)*

+ *Fertile stems different from the sterile ones, earlier, brownish.*

++ *Fertile stems never branching, decaying early after fructification: the sterile stems bearing simple branches.*

1. **E. arvénse,** L. Sterile stems smoothish, 12 – 14-*furrowed, and producing ascending sharply* 4- (or 3 – 5-) *angled long branches,* with 4 herbaceous lanceolate pointed teeth; *sheaths of the fertile stems* (8′ – 15′ high) *remote,* large and loose. — Damp places; common. (Eu.)

2. **E. ebúrneum,** Schreber. Sterile stems very smooth, ivory-white, *about* 30-*furrowed,* the rough usually 4-angled *branches again grooved on the angles,* and with awl-shaped fragile teeth; *sheaths of the fertile stems crowded,* deeply toothed. (E. fluviatile, *Smith.*) — Shore of the Great Lakes, and northward. — Fertile stems 1° or more high, stout; the sterile 2° – 5°. (Eu.)

++ ++ *Fertile stems remaining and producing herbaceous branches after fructification.*

3. **E. praténse,** Ehrh. Sterile and finally also the fertile stems bearing whorls of *simple straight branches;* sheaths of the stem split into separate ovate-lanceolate short teeth, those of the branches 3-toothed: otherwise much like the next; in its simple branches resembling No. 1, but narrower in general outline, and blunt. (E. umbrosum, *Willd.* E. Drummondii, *Hook.*) — Michigan (*Cooley, &c.*) and northward. (Eu.)

4. **E. sylváticum,** L. Sterile and fertile stems about 12-furrowed, bearing whorls of *compound racemed branches;* sheaths loose, with 8 – 14 rather blunt membranous *more or less united teeth;* those of the branches bearing 4 or 5, of the branchlets 8, lance-pointed divergent teeth. — Wet shady places; common northward. (Eu.)

+ \+ *Fertile and sterile stems similar and contemporaneous, both herbaceous, or all the stems fertile, fruiting in summer, producing mostly simple branches from the upper or middle joints, or sometimes quite naked.*

5. **E. limòsum,** L. Stems tall (2° – 3° high), smooth, slightly many-furrowed, usually producing upright simple branches after fructification; sheaths appressed, with 10 – 22 (commonly about 18) dark-brown and acute rigid short teeth. (E. uliginosum, *Muhl.*) — In shallow water; rather common. — Air-cavities none under the grooves, but small ones under the ridges. (Near this is the European E. PALÚSTRE, with a strongly grooved roughish stem, large air-cavities under the grooves, and pale 6 – 9-toothed sheaths; also attributed to this country by Pursh, probably incorrectly.) (Eu.)

* * *Stems perennial, bearing fructification in summer, lasting over the next winter and longer, mostly rough (the cuticle abounding in silex), simple or rarely branched. (Stomata in regular rows, in our species 1-rowed on each side of the groove.)*

— *Stems large, mostly single: sheaths appressed.* (Probably all forms of No. 8.)

6. **E. lævigàtum,** Braun. Stems 1½° – 4° high; the *ridges convex, obtuse, smooth or minutely rough* with minute tubercles; *sheaths elongated,* with a narrow black limb and about 22 *linear-awl-shaped caducous teeth,* 1-*keeled below.* — Dryish clay soil, Illinois and southward.

7. **E. robústum,** Braun. Stems 3° - 6° high; the *ridges narrow, rough with one line of tubercles: sheaths short,* with a black girdle above the base, rarely with a black limb, and about 40 *deciduous 3-keeled teeth with ovate-awl-shaped points.* — River-banks, Ohio to Illinois, and southward. — Too near the last; and passes by var. AFFÍNE, Engelm. (a smaller plant, with 20 - 25 awl-pointed more persistent teeth) into the next.

8. **E. hyemàle,** L. (SCOURING RUSH. SHAVE-GRASS.) Stems 1½° - 3° high, the *ridges* roughened by 2 more or less distinct lines of *tubercles; sheaths elongated,* with a black girdle above the base, and a black limb, consisting of about 20 (17 - 26) *narrowly linear teeth,* 1-*keeled at the base and with awl-shaped deciduous points.* — Wet banks; common, especially northward. Used for scouring. (Eu.)

+ + *Stems low and slender, growing in tufts: sheaths loose or enlarging upwards; the summits of their 4-keeled ovate membranaceous and persistent teeth tipped with a fragile awn or cusp.*

9. **E. variegàtum,** Schleicher. *Stems ascending* (6′ - 12′ long), simple, from a branched base, 5 - 9-*grooved*; the ridges rough with 2 rows of tubercles which are separated by a secondary furrow; sheaths green variegated with black above; the 5 - 9 teeth tipped with a deciduous bristle. — Shores or river-banks, New Hampshire (Bellows Falls, *Carey*) to Wisconsin, and northward; rare. (Eu.)

10. **E. scirpoìdes,** Michx. *Stems thread-like* (4′ - 8′ high), bent or curved, rough, 3 - 4-*grooved* alternately with as many bristle-pointed teeth, *and with the same number of intermediate furrows of equal width;* sheaths variegated with black; *central air-cavity wanting.* — Wooded hill-sides, New England to Pennsylvania, Michigan, and northward. (Eu.)

ORDER 136. FÍLICES. (FERNS.)

Leafy plants, with the leaves (fronds) *usually raised on a stalk or petiole (called the stipe), rising from a root or mostly from prostrate or subterranean rootstocks, separately rolled up* (circinate) *in the bud* (except in Suborder III.), *and bearing, on the veins of their lower surface or along the margins, the simple fructification, which consists of* 1-*celled spore-cases* (sporangia), opening in various ways, and discharging the numerous minute spores. (Antheridia and pistillidia formed on the seedling plantlet!) — Comprises three very distinct Suborders, which now are by many received as separate families: —

SUBORDER I. POLYPODINEÆ. THE TRUE FERNS.

Sporangia collected in dots, lines, or variously shaped clusters (*sori* or *fruit-dots*) on the back or margins of the frond or its divisions, stalked, cellular-reticulated, the stalk running into a vertical incomplete ring, which by straightening at maturity ruptures the sporangium transversely on the inner side, discharging the spores. Fruit-dots often covered (at least when young) by a membrane called the *indusium*, growing either from the back or the margin of the frond. (Tab. 9–12.)

Tribe I. **POLYPODIEÆ.** Fructification dorsal, naked, entirely destitute of any indusium, in roundish separate fruit-dots.

1. POLYPODIUM. Fertile fronds like the sterile ones, wholly leaf-like, not rolled up. Fruit-dots scattered on the back, borne each on the end of a veinlet.

2. STRUTHIOPTERIS. Fertile frond very different from the sterile, contracted and rigid, its pinnate divisions rolled up from each margin into a closed necklace-like body, concealing the fruit-dots within, which are borne on the middle of a vein.

Tribe II. **PTERIDEÆ.** Fructification marginal or intramarginal, provided with a general indusium formed of the (either altered or unchanged) margin of the frond, and which is therefore free and opens on the inner side, towards the midrib, transverse as respects the veins. Venation in our genera free.

* Indusium continuous, consisting of the entire reflexed and altered (scarious-membranaceous) margin of the fertile frond or of its pinnæ or pinnules

3. ALLOSORUS Sporangia borne on the free and separate extremity of the veins or veinlets, becoming confluent laterally. Indusium broad.

4. PTERIS. Sporangia borne on a continuous receptacle, in the form of a slender marginal line, which connects the tips of the veinlets.

* * Indusium the summit or margin of a separate lobe or tooth of a fertile frond or of its divisions turned over. Sporangia borne on the free ends of the veins or veinlets.

5. ADIANTUM. Sporangia borne on the under side of the strictly reflexed indusium. Midrib of the pinnules marginal or none.

6. CHEILANTHES. Sporangia borne on the frond, the unaltered herbaceous summit or margins of the lobes of which are recurved to form an imperfect involucre. Midrib central.

Tribe III. **BLECHNEÆ.** Fructification dorsal; the oblong or linear fruit-dots borne on cross veinlets *parallel* to the midrib, transverse as to the principal veins, covered with a special indusium (entirely separate from the margin of the frond), which is fixed by the edge that looks towards the margin, but free and opening towards the midrib.

7. WOODWARDIA. Fruit-dots oblong or linear, distinct or contiguous: veins more or less reticulated.

Tribe IV. **ASPLENIEÆ.** Fructification dorsal; the more or less elongated fruit-dots borne on the back of the frond, on direct veins *oblique or at right angles* to the midrib and margins, each with a special indusium fixed to the fruitful vein by one margin, and free and opening at the other.

8. CAMPTOSORUS. Veins reticulated except near the margin. Fruit-dots irregularly scattered over the frond, inclined to approach in pairs.

9. SCOLOPENDRIUM. Veins simply forked, straight and free. Fruit-dots linear, confluent in pairs, which appear like a single one with a double indusium, opening down the middle.

10. ASPLENIUM. Veins forked and free Fruit-dots oblique, separate, each on the upper (inner) side of a vein, rarely some of them double, when the two indusia are on the same vein, back to back.

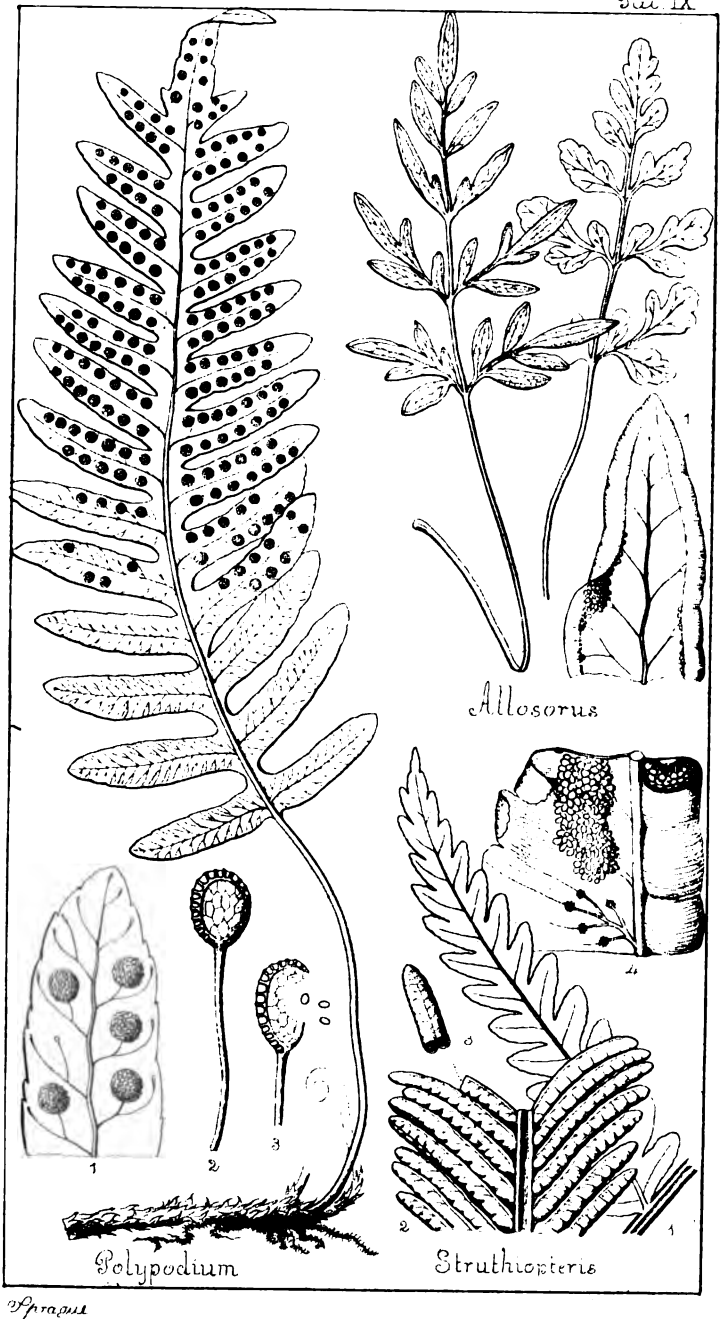
Tribe V. **DICKSONIEÆ.** Fructification marginal: fruit-dots roundish, borne on the apex of a free vein, furnished with an indusium in the form of a cup, open at the top, formed in part of (or confluent with) a toothlet or portion of the margin of the frond.

11. DICKSONIA § SITOLOBIUM. Indusium hemispherical-cup-shaped or almost globular, membranaceous.

Tribe VI. **WOODSIEÆ.** Fructification dorsal: the globular fruit-dots borne on the back of a free vein, furnished with a special (sometimes evanescent) indusium in the form of a membrane attached underneath all round, and bursting open at the top.

Genera of Filices

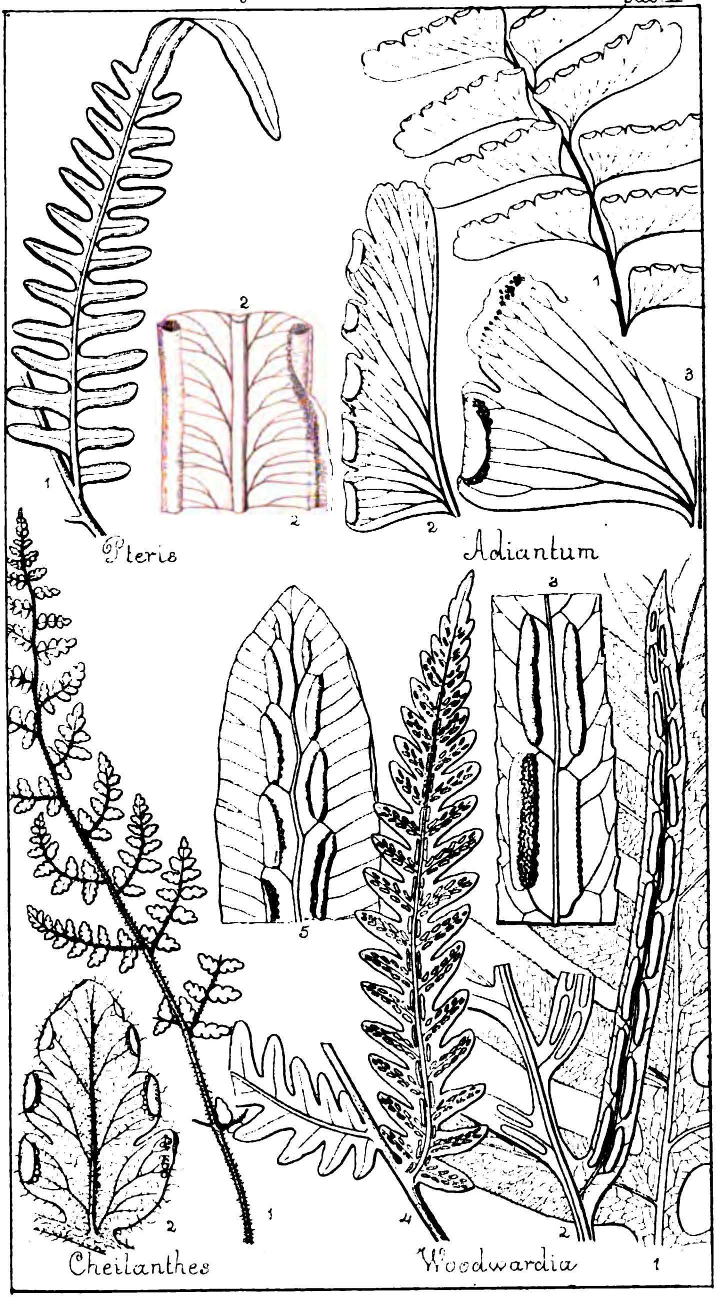
Tab. IX



Sprague

Genera of Filices

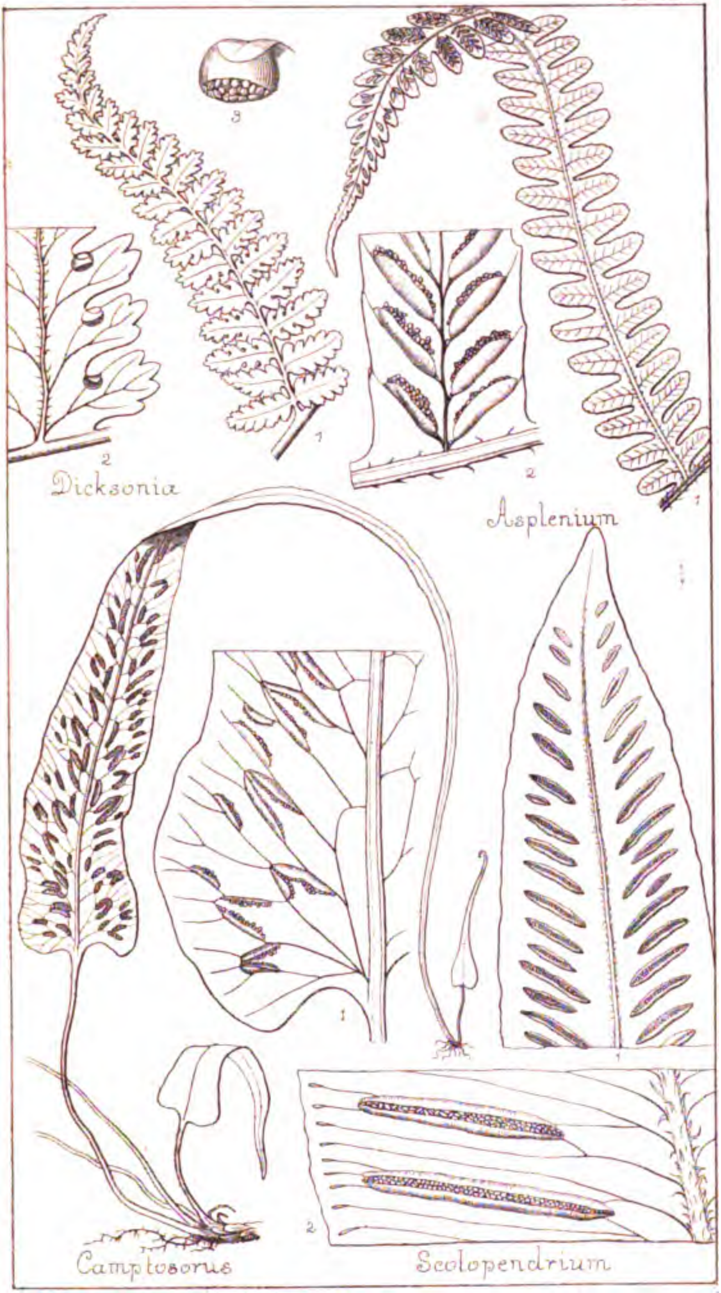
Tab. X



Sprague

Genera of Filices

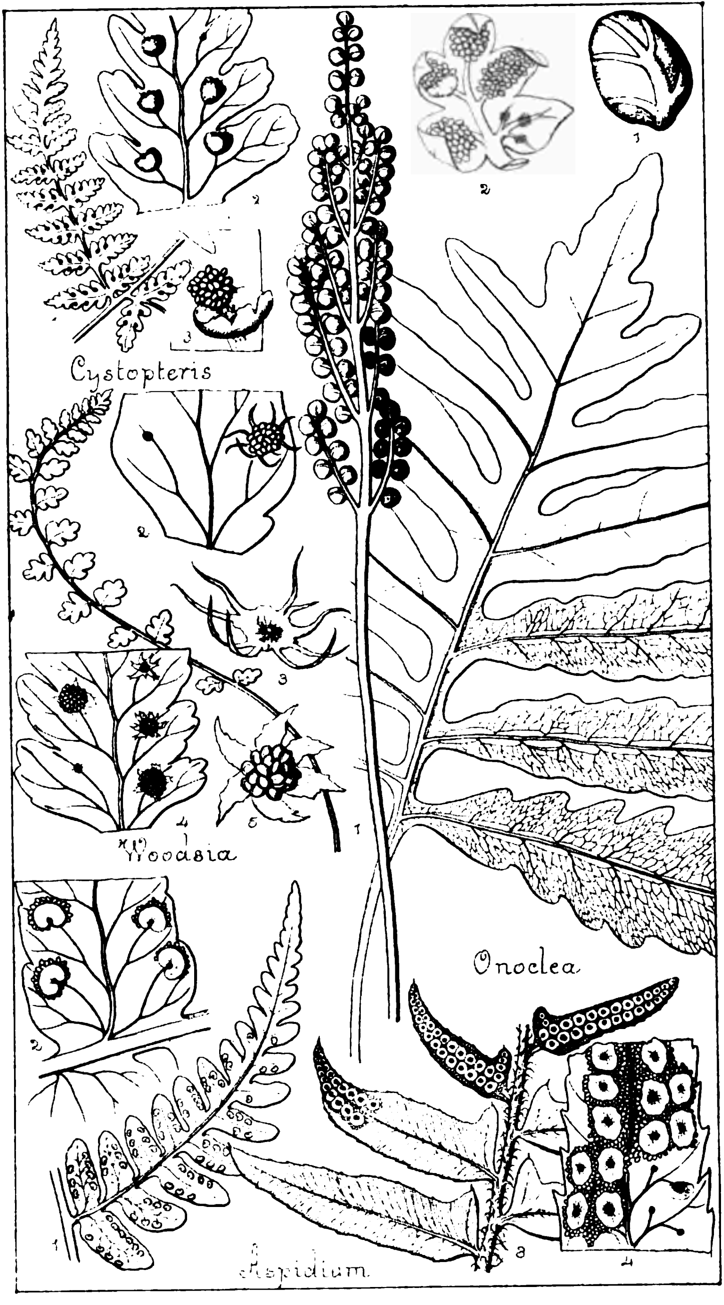
Tab. XI



Sprague

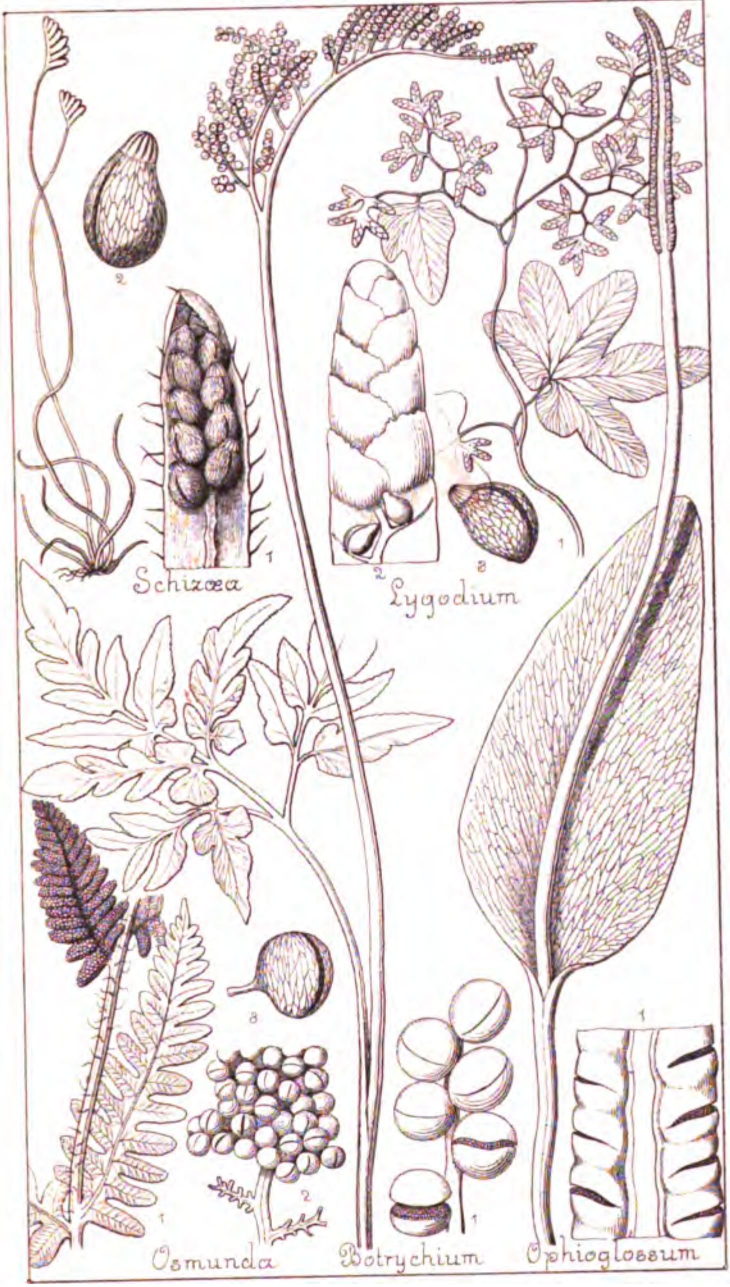
Genera of Filices

Tab. XII



Genera of Filices

Tab. XIII



13. WOODSIA. Indusium very thin or obscure and evanescent, bursting into irregular lobes or cleft into a fringe of hairs.

Tribe VII. ASPIDIEÆ. Fructification dorsal: the fruit-dots borne on the back (rarely on the apex) of a vein, orbicular or roundish, rarely oblong and then placed across the vein, furnished each with a special indusium which covers the sporangia when young, and is fixed by the centre or by one side, opening at the other side or all around the margin. No general or accessory indusium formed of the margin of the frond.

* Veins all free (none anastomosing): fertile fronds not very different from the sterile.

13. CYSTOPTÈRIS. Indusium hood-like, broadly fixed by the inner side partly under the fruit-dot, free and early opening on the outer.

14. ASPIDIUM. Indusium flat, orbicular or kidney-shaped, opening all round the margin.

* * Veins of the sterile frond reticulated: fertile frond very unlike the sterile.

15. ONOCLEA. Fertile frond contracted, the divisions rolled up into globular bodies enclosing the fruit-dots.

SUBORDER II. OSMUNDINEÆ. THE FLOWERING FERN FAMILY.

Sporangia variously collected (large), destitute of any proper ring, cellular-reticulated, opening lengthwise by a regular slit. (Tab. 13.)

Tribe VIII. SCHIZEÆ. Sporangia oblong or oval, sessile, with a circular striate-rayed portion at the apex, opening down the outer side.

16. SCHIZÆA. Indusium none: sporangia covering one side of the linear pinnæ of the naked and stalk-like fertile frond.

17. LYGODIUM. Indusia in the form of scales imbricated in 2 ranks on one side of the fertile lobes of the leafy climbing frond.

Tribe IX. OSMUNDEÆ. Sporangia globose, pedicelled, opening down the outer side so as to be two-valved.

18. OSMUNDA. Sporangia naked, covering contracted fronds or parts of the frond.

SUBORDER III. OPHIOGLOSSEÆ. THE ADDER'S-TONGUE FAM.

Sporangia spiked, closely sessile, naked, coriaceous and opaque, not reticulated or veiny, destitute of a ring, opening by a transverse slit into 2 valves, discharging very copious powdery spores.—Fronds straight, never rolled up in the bud! (Tab. 13.)

19. BOTRYCHIUM. Sporangia distinct, crowded in compound or pinnate spikes. Sterile frond divided.

20. OPHIOGLOSSUM. Sporangia cohering in a 2-ranked simple spike. Sterile frond entire.

SUBORDER I. POLYPODÍNEÆ. THE TRUE FERN FAMILY.

1. POLYPÒDIUM, L. POLYPODY. (Tab. 9.)

Fruit-dots round, naked, variously or irregularly scattered over the back of the flat and expanded leaf-like frond, each borne on the end of a veinlet.—Rootstocks creeping, often covered with wool-like chaff, and with tufted branches (whence the name, from πολύ, *many*, and ποῦς, *foot*).

§ 1. POLYPODIUM PROPER.—*Veins free (not connected by cross veinlets).*

* *Fronds simply and deeply pinnatifid, evergreen, glabrous: fruit-dots large.*

1. **P. vulgàre,** L. Fronds oblong in outline, green both sides (6′-12′ high); the divisions linear-oblong, obtuse, minutely and obscurely toothed.—Rocks; common. July. (Eu.)

* * *Fronds twice pinnatifid, triangular, membranaceous, annual: fruit-dots minute.*

2. **P. Phegópteris,** L. *Stalk somewhat chaffy and downy; frond* narrowly triangular in outline, *longer than broad* (3′-6′ long), hairy on the veins; pinnæ linear-lanceolate, closely approximated, the lowest pair deflexed and standing forwards; their divisions linear-oblong, obtuse, entire, each bearing about 4 fruit-dots towards the base and near the margin. (P. connectile, *Michx.*)—Damp woods; common northward. July. (Eu.)

3. **P. hexagonópterum,** Michx. *Stalk smooth; frond broadly triangular, the base* (7′-12′ broad) *usually exceeding the length;* pinnæ rather distant, the lower of the lanceolate obtuse divisions toothed, decurrent and forming a conspicuous wing to the rhachis.—Rather open woods; common, especially southward.—Smoother and larger than the last.

* * * *Fronds membranaceous, ternate, the primary divisions mostly twice pinnate.*

4. **P. Dryópteris,** L. Stalk slender and brittle, smooth; frond smooth (pale light-green, 4′-6′ wide); the 3 principal divisions widely spreading; lobes oblong, obtuse, nearly entire; fruit-dots marginal, finally contiguous.—Var. CALCÀREUM (P. calcareum, *Smith*) is more rigid, and minutely glandular-mealy on the rhachis and midribs.—Rocky woods; common northward. July. (Eu.)

§ 2. MARGINÀRIA, Bory.—*Veins reticulated, forming mostly 6-sided meshes around the free veinlets which bear the fruit-dots: stalks and back of the thick or coriaceous frond beset with firm scurfy chaffy scales.* (This is probably a distinct genus; but in our species the veins are so hidden in the coriaceous frond, that they can seldom be seen at all.)

5. **P. incànum,** Willd. Fronds oblong, 2′-6′ long from extensively creeping firm rootstocks, grayish and very scurfy underneath with thick peltate scurfy scales, almost concealing the fruit-dots, which are borne on the margins of the broadly linear entire lobes.—Rocks and trunks of trees, Virginia and Ohio to Illinois, and southward.

9. STRUTHIÓPTERIS, Willd. OSTRICH-FERN. (Tab. 9.)

Fruit-dots round, on the pinnæ of a separate contracted and rigid frond, the margins of which are rolled backward so as to form a somewhat necklace-shaped body enclosing the fruit: there are 3-5 pinnate free veinlets from each primary vein, each bearing a fruit-dot on its middle: the fruit-dots are so numerous and crowded that they appear to cover the whole inside.—Sterile fronds large (2°-3° high), very much exceeding the fertile, pinnate, the many pinnæ deeply pinnatifid, all growing in a close circular tuft from thick and scaly matted rootstocks. Stalks stout, angular. Pinnate veins free and simple. (Name compounded of *στρουθός, an ostrich*, and *πτερίς, a fern*, from the plume-like arrangement of the divisions of the fertile frond.)

1. **S. Germánica,** Willd. (S. Pennsylvanica, *Willd.*)—Alluvial soil; not rare northward. Aug.—Fronds of this in a curious abnormal state, inter-

mediate between the sterile and fertile condition, (bearing a few fruit-dots on contracted but still herbaceous and open pinnæ,) were gathered at Brattleborough, Vermont, by *Mr. D. C. Eaton.* (Eu.)

3. ALLOSÒRUS, Bernhardi. ROCK BRAKE. (Tab. 9.)

Fruit-dots a small collection of sporangia borne on the ends of (or extending down on) the forked, or rarely simple, free veins, which terminate just within the margin of the frond, soon becoming confluent laterally, so as to imitate the marginal continuous line of fructification of Pteris, covered when young by a continuous (rarely interrupted) rather broad scarious-membranaceous indusium consisting of the reflexed and altered margin of the fruit-bearing pinnule or division. Fronds once to thrice pinnate; the fertile ones or fertile divisions narrower than the sterile. (Name from ἄλλος, *various*, and σωρός, *sorus, a heap*, used for fruit-dot.)

1. **A. grácilis,** Presl. Smooth, low (3′–6′ high, and *delicate*); *fronds membranaceous*, of few pinnæ, which are pinnately parted into 3–5 divisions, those of the fertile frond oblong or linear-oblong, of the sterile ovate or obovate, crenate or incised; veins of the fertile fronds mostly only once forked. (Pteris gracilis, *Michx.*) — Shaded calcareous rocks, Vermont to Wisconsin, and northward; rare. July.

2. **A. atropurpùreus.** Smooth, except some bristly-chaffy hairs on the midribs and especially on the *dark-purple and polished stalk* and rhachis, 6′–15′ high; *frond coriaceous*, pale, once or below twice pinnate; the divisions broadly linear or oblong, or the sterile sometimes oval, chiefly entire, somewhat heart-shaped or else truncate at the stalked base; veins about twice forked. (Pteris atropurpurea, *L.* Platyloma atropurpurea, *J. Smith.*) — Calcareous dry rocks, in shade, Vermont to Wisconsin, and southward: not common.

A. (CRYPTOGRÁMMA, R. Br.) ACROSTICHOÌDES, remarkable for its sporangia extending far down on the oblique veins, so as to form linear lines of fruit, may occur within our northwestern borders, having been found as near as Isle Royale, Lake Superior.

4. PTÈRIS, L. BRAKE. BRACKEN. (Tab. 10.)

Fruit-dots a continuous slender line of fructification, occupying the entire margins of the fertile frond, and covered by its reflexed narrow edge which forms a continuous membranaceous indusium: the sporangia attached to an uninterrupted transverse vein-like receptacle which connects the tips of the forked and free veins. — Fronds 1–3-pinnate or decompound. (The ancient Greek name of Ferns, from πτερόν, *a wing*, on account of the prevalent pinnate or feathery fronds.)

1. **P. aquilìna,** L. (COMMON BRAKE.) Frond dull green (2°–3° wide), ternate at the summit of an erect stout stalk (1°–2° high), the widely spreading branches 2-pinnate; pinnules oblong-lanceolate, the upper undivided, the lower more or less pinnatifid, with oblong obtuse lobes, margined all round with the indusium. — Thickets and hills; common northward. Aug. (Eu.)

Var. **caudàta.** Frond somewhat more coriaceous; the pinnules with narrower and less crowded lobes, the terminal one linear and prolonged (1′–2′ in length), entire, forming a tail-like termination, or the whole of many of the pinnules sometimes linear and entire. (P. caudata, *L.*) — Common southward, and at the north varying into the typical form.

5. ADIÁNTUM, L. MAIDENHAIR. (Tab. 10.)

Fruit-dots marginal, short; borne on the under side of a transversely oblong, crescent-shaped or roundish, more or less altered margin or summit of a lobe or tooth of the frond reflexed to form an indusium: the sporangia attached to the approximated tips of the free forking veins. — Main rib (costa) of the pinnules none, or at one margin. Stalks black and polished. (The ancient name, from *a* privative and διαίνω, meaning *unwetted*, the smooth foliage repelling rain-drops.)

1. **A. pedàtum,** L. Frond forked at the summit of the upright slender stalk (9′–15′ high), the forks pedately branching from one side into several slender spreading divisions, which bear numerous triangular-oblong and oblique short-stalked pinnules; these are as if halved, being entire on the lower margin, from which the veins all proceed, and cleft and fruit-bearing on the other. — Rich, moist woods. July. — A delicate and most graceful Fern.

6. CHEILÁNTHES, Swartz. LIP-FERN. (Tab. 10.)

Fruit-dots small and roundish, solitary or contiguous next the margins or tips of the lobes, which are recurved over them to form a hood-like (herbaceous or membranaceous) indusium; the sporangia borne on the tips of free forking veins. — Fronds 1–3-pinnate, the sterile and fertile nearly alike; the divisions not halved, the main rib central. (When the indusium becomes continuous, the genus passes into Allosorus.) (Name composed of χεῖλος, *a lip*, and ἄνθος, *flower*, from the shape of the indusium.)

1. **C. vestìta,** Willd. (not of Hook.?) *Fronds 2-pinnate* (slender, 4′–7′ high), and stalks *hirsute with loose and rather scattered rusty hairs*; pinnules oblong, pinnatifid (2″–4″ long), their lobes oval or oblong, the recurved portion forming the indusium herbaceous. — Shaded rocks, S. Penn., Virginia, Kentucky, and southward. — Fronds soon nearly glabrous above.

2. **C. tomentòsa,** Link. *Fronds* (1°–1½° high) with the rather stout stalk, &c. *densely woolly and villous throughout* (the upper surface becoming smoothish with age), *thrice pinnate; pinnules obovate* or roundish, nearly entire, sometimes confluent, the recurved narrow margins forming an almost continuous involucre. (Nephrodium lanosum, *Michx.* in part?) — Mountains of Virginia? Kentucky; thence westward and southward.

7. WOODWÁRDIA, Smith. WOODWARDIA. (Tab. 10.)

Fruit-dots oblong or linear, approximate or contiguous, parallel to and near the midrib, on transverse anastomosing veinlets, in one or rarely two rows; the veins reticulated towards the midrib, mostly forking, free towards the margin of the frond. Indusium fixed to the outer margin of the fruitful veinlet, free and opening on the side next the midrib. — Fronds pinnatifid or pinnate. (Named for *S. Woodward*, an English naturalist of the last century.)

§ 1. WOODWARDIA PROPER. — *Indusium strongly vaulted: veins (at least of the sterile frond) with several rows of reticulations.*

1. **W. angustifòlia,** Smith. Sterile fronds (1° high, thin, bright green) deeply pinnatifid, with lanceolate serrulate divisions; the fertile simply pinnate, with contracted linear pinnæ (2″–4″ wide), its single row of cross veins bearing the fruit-dots (½′ long) as near the margins as the midrib. (W. onocleoides, *Willd.*) — Bogs, Massachusetts, near the coast, to Virginia, and southward: rare. Aug.

§ 2. DOÓDIA, R. Brown. — *Indusium flattish: cross veins only one or two rows.*

2. **W. Virgínica,** Willd. Fertile and sterile fronds similar (2° high), pinnate; the pinnæ lanceolate, pinnatifid, with numerous oblong lobes; fruit-dots contiguous or soon confluent, forming a line on each side of the midrib, both of the pinnæ and of the lobes. — Swamps, Vermont and New York to Virginia, and southward. July.

8. CAMPTOSÒRUS, Link. WALKING-LEAF. (Tab. 11.)

Fruit-dots linear or oval-oblong, irregularly scattered on the reticulated veins of the simple frond, variously diverging, inclined (especially those of the secondary reticulations) to approximate in pairs by the side at which the indusium opens, or to become confluent at their ends, forming crooked lines or angles (whence the name, from *καμπτός*, *bent*, and *σωρός*, for *fruit-dot*).

1. **C. rhizophýllus,** Link. (Asplenium rhizophyllum, *L.* Antigramma, *J. Smith*, *Torr.* Also C. rumicifolius, *Link.*) — Shaded rocks, W. New England to Wisconsin, and southward; rare. July. — Fronds evergreen, growing in tufts, spreading or procumbent (4′–9′ long), lanceolate from an auricled-heart-shaped base, tapering above into a slender prolongation like a runner, which often roots at the apex and gives rise to new fronds, and these in turn to others; hence the popular name. — A singular form is found at Mount Joy, Penn., by *Mr. Stauffer*, having roundish fruit-dots and inconspicuous veins.

9. SCOLOPÉNDRIUM, L. HART'S-TONGUE. (Tab. 11.)

Fruit-dots linear, elongated, almost at right angles with the midrib of the simple frond, borne in pairs on the contiguous sides of the two parallel forks of the straight free veins, one on each, but so confluent side by side as to appear like one, opening by an apparently double indusium down the middle. (The ancient Greek name, so called because the numerous parallel lines of fruit resemble the feet of the centipede, or Scolopendra.)

1. **S. officinàrum,** Swartz. Frond oblong-lanceolate from an auricled-heart-shaped base, entire or wavy-margined (7′–18′ long, 1′–2′ wide), bright green. — Limestone rocks, in a deep ravine at Chittenango Creek, below the Falls, where it abounds, and also, perhaps, in some other places in W. New York ("near Canandaigua," *Nuttall*). (Eu.)

10. ASPLÈNIUM, L. Spleenwort. (Tab. 11.)

Fruit-dots linear or oblong, oblique, separate; the indusium attached lengthwise by one edge to the upper (inner) side of the simple, forked or pinnate, free veins, and opening along the other: — rarely some of the fruit-dots are double (Diplazium), two indusia being then borne on the same vein, back to back. (Named, from *a* privative and σπλήν, *the spleen*, for supposed remedial properties.)

§ 1. ASPLENIUM Proper. — *Indusium narrow, fixed by its whole length.*

* *Indusium flat or flattish, thin.* (*Fronds evergreen.*)

1. **A. pinnatifidum,** Nutt. *Fronds* (3′–6′ long) diffusely spreading, *lanceolate, pinnatifid,* sometimes pinnately parted near the base, *tapering above into a slender prolongation, the apex sometimes rooting; lobes roundish-ovate, obtuse,* cut-toothed or nearly entire; *the midrib evanescent* by forking below the apex. — Cliffs on the Schuylkill and Wissahickon, near Philadelphia, and southward along the Alleghanies; also sparingly westward: rare. July. — Resembling the Walking-Leaf (Camptosorus), but the venation is that of Asplenium: fruit-dots irregular, numerous, even the slender prolongation fertile.

2. **A. montànum,** Willd. *Fronds* (3′–5′ high, bright green) *lanceolate or triangular-oblong in outline, pinnate; the ovate pinnæ 3–7-parted* (or the upper barely cleft) *and cut-toothed;* the veins forking from a midrib. — Cliffs, in the Alleghany Mountains, from Pennsylvania (*Mr. Lea*) to Virginia, and southward. July. — Rhachis green: stalk brownish. — Much smaller than the European A. Adiantum-nigrum.

3. **A. Ruta-murària,** L. *Fronds* (2′–4′ long) *2-pinnate below, simply pinnate above,* ovate in outline, the few *divisions narrowly rhombic-wedge-shaped, toothed at the apex, without a midrib,* the veins all rising from the base. — Limestone cliffs, Vermont to Michigan, Virginia, and southward along the mountains; scarce. July. (Eu.)

4. **A. Trichómanes,** L. *Fronds* (3′–8′ long) in dense spreading tufts, *linear in outline, pinnate: pinnæ numerous, roundish-oblong or oval* (3″–4″ long), *unequal-sided, obliquely wedge-truncate at the base,* attached by a narrow point, the midrib evanescent; the thread-like stalk and rhachis purple-brown and shining. (A. melanocaulon, *Willd.*) — Shaded cliffs; common. July. (Eu.)

5. **A. ebèneum,** Ait. *Fronds* upright (8′–16′ high), *pinnate, lance-linear in outline; pinnæ* (½′–1′ long) many, *lanceolate,* or the lower oblong, slightly scythe-shaped, finely serrate, sessile, the dilated base auricled on the upper or both sides; fruit-dots numerous on both sides of the elongated midrib; stalk and rhachis blackish-purple and shining. — Rocky, open woods; rather common.

* * *Indusium strongly convex or vaulted, thickish: fruit-dots numerous and crowded on both sides of the midrib, parallel, some of them occasionally double, especially in No. 7.* (*Fronds thin, smooth, decaying in autumn,* 1½°–3° *high.*)

6. **A. angustifòlium,** Michx. *Fronds simply pinnate;* pinnæ linear-lanceolate, acute, minutely wavy-toothed (3′–4′ long); *fertile fronds more con-*

tracted; fruit-dots linear, often curved. — Rich woods, W. New England to Michigan, Kentucky, and southward along the mountains. Aug., Sept.

7. **A. thelypteroìdes,** Michx. *Fronds pinnate; pinnæ deeply pinnatifid,* linear-lanceolate (3′–5′ long), pale; the lobes oblong, obtuse, minutely toothed, crowded, each bearing 3–6 pairs of *oblong fruit-dots.* — Rich woods; not rare. July.

§ 2. ATHÝRIUM, Roth. — *Indusium of the shorter (barely oblong) fruit-dots somewhat free at the ends, turgid or vaulted, but thin, often becoming curved or crescent-shaped.*

8. **A. Filix-fœ́mina,** R. Brown. Frond 2-pinnate (1°–3° high, smooth), oblong or lanceolate in outline; pinnæ lanceolate, numerous; the narrowly oblong pinnules confluent on the rhachis by a narrow margin, sharply pinnatifid-toothed; fruit-dots 4–8 pairs on each pinnule. (Aspidium Filix-fœmina & A. asplenioides, *Swartz.*) — A narrow form is Aspidium angustum, *Willd.* — Moist woods; common. July. (Eu.)

11. DICKSÒNIA, L'Her. § SITOLOBIUM, Desv. (Tab. 11.)

Fruit-dots globular (small), marginal, each placed on the apex of a free vein or fork, enclosed in a membranaceous cup-shaped special indusium open at the top, and on the outer side partly covered by the thin apex of the fruit-bearing toothlet of the frond, forming a sort of accessory indusium. Sporangia borne on a somewhat elevated globular receptacle. (Character from our species, which is perhaps to be separated.) (Named for *J. Dickson,* an English Cryptogamous botanist.)

1. **D. punctilóbula,** Hook. Minutely glandular and hairy (2° high); fronds ovate-lanceolate and pointed in outline, pale green and very thin, with strong stalks rising from slender extensively creeping rootstalks, pinnate, the lanceolate pinnæ twice pinnatifid and cut-toothed, the lobes oblong; fruit-dots minute, on a recurved toothlet, usually one at the upper margin of each lobe. (D. pilosiuscula, *Willd.* Nephrodium punctilobulum, *Michx.* Patania, *Presl.*) — Moist, rather shady places, very common: odorous. July.

12. WOÓDSIA, R. Brown. WOODSIA. (Tab. 12.)

Fruit-dots globular, borne on the back of simply-forked free veins; the very thin and often evanescent indusium attached by its base all around the receptacle, *under* the sporangia, either small and open, or else early bursting at the top into irregular pieces or lobes. — Small and tufted pinnately-divided Ferns. (Dedicated to *Joseph Woods,* an English botanist.)

§ 1. HYPOPÉLTIS, Torr. — *Indusium conspicuous, at first perfectly enclosing the sporangia, but early opening at the top, soon splitting into several spreading jagged lobes.*

1. **W. obtùsa,** Torr. Frond broadly-lanceolate, minutely glandular-hairy (6′–12′ high), pinnate; the pinnæ rather remote, triangular-ovate or oblong (1′ or more long), bluntish, pinnately parted; pinnules oblong, very

obtuse, crenately pinnatifid-toothed, with a single smooth fruit-dot just below the sinus between each rounded minutely-toothed lobe. (W. Perriniana, *Hook. & Grev.* Aspidium obtusum, *Willd.*) — Rocky banks and cliffs; common, especially westward. July.

§ 2. WOODSIA PROPER. — *Indusium minute or evanescent, open and flattened from an early stage and concealed under the fruit-dot, except the fringe of bristly-chaffy hairs into which its margin is dissected.*

2. **W. Ilvénsis,** R. Brown. *Frond oblong-lanceolate* (2′ - 4′ long by 1′ wide), smoothish and green above, *thickly clothed underneath as well as the stalk with rusty bristle-like chaff,* pinnate; the pinnæ crowded, oblong, obtuse, sessile, pinnately parted, *the numerous crowded pinnules oblong,* obtuse, obscurely crenate, almost coriaceous, the fruit-dots near the margin, somewhat confluent when old. (Nephrodium rufidulum, *Michx.*) — Exposed rocks, common, especially northward, and southward in the Alleghanies. June. (Eu.)

3. **W. glabélla,** R. Brown. *Smooth and naked throughout; frond linear* (2′ - 5′ high), pinnate; *pinnæ* rather remote towards the short stalk, *rhombic-ovate,* very obtuse (2′′ - 4′′ long), *cut into* 3 - 7 *rounded or somewhat wedge-shaped lobes.* — Rocks, Little Falls, New York (*Vasey*); Willoughby Mountain, Vermont (*Wood, C. C. Frost*); and high northward.

13. CYSTÓPTERIS, Bernhardi. BLADDER-FERN. (Tab. 12.)

Fruit-dots roundish, borne on the back of a straight fork of the free veins; the delicate indusium hood-like or arched, attached by a broad base on the inner side (towards the midrib) partly under the fruit-dot, early opening free at the other side, which looks toward the apex of the lobe, and is somewhat jagged, soon thrown back or withering away. — Tufted Ferns with slender and delicate 2 - 3-pinnate fronds; the lobes cut-toothed. (Name composed of κύστις, a *bladder,* and πτερίς, *Fern,* from the inflated indusium.)

1. **C. bulbífera,** Bernh. *Frond lanceolate, elongated* (1° - 2° long), 2-pinnate; the pinnæ lance-oblong, pointed, horizontal (1′ - 2′ long); the *rhachis and pinnæ often bearing bulblets underneath, wingless;* pinnules crowded, oblong, obtuse, toothed or pinnatifid; indusium short, truncate on the free side. (Aspidium bulbiferum, *Swartz.* A. atomarium, *Muhl. !*) — Shaded, moist rocks; common. July.

2. **C. frágilis,** Bernh. *Frond oblong-lanceolate* (4′ - 8′ long, besides the stalk which is fully as long), 2 - 3-pinnate; the pinnæ and *pinnules* ovate or lanceolate in outline, irregularly pinnatifid or cut-toothed, mostly acute, *decurrent on the margined or winged rhachis;* indusium tapering or acute at the free end. — Var. DENTÀTA, Hook. is narrower and less divided, barely twice pinnate, with ovate obtuse and bluntly-toothed pinnules. (Aspidium tenue, *Swartz.*) — Shaded cliffs; common: very variable. July. (Eu.)

14. ASPÍDIUM, Swartz. SHIELD-FERN. WOOD-FERN. (Tab. 12.)

Fruit-dots round or roundish, borne on the back or sometimes on the extremity of (in our species) pinnate and free veins, scattered, or sometimes

crowded. Indusium flat, scarious, orbicular or round-kidney-shaped, covering the sporangia, attached to the receptacle at the centre or at the sinus, opening all round the margin. — Fronds mostly 1–3-pinnate. (Name ἀσπίδιον, *a small shield*, from the shape of the indusium.)

§ 1. **DRYÓPTERIS**, Adans., Schott. (Nephròdium, *Rich.* in part. Lastrea, *Bory.*) — *Indusium round-kidney-shaped, or orbicular with a narrow sinus, fixed at the sinus: fronds membranaceous or thinnish.*

* *Veins simple or simply forked and straight: fronds annual, decaying in autumn, the stalks and creeping rootstocks nearly naked.* (Thelýpteris, *Schott.*)

1. **A. Thelýpteris,** Swartz. Frond pinnate, *lanceolate* in outline; the slightly reflexed or horizontal *pinnæ gradually diminishing in length from near the base to the apex*, sessile, linear-lanceolate, deeply pinnatifid, with oblong nearly entire obtuse lobes, or appearing acute from the *strongly revolute margins in fruit; veins mostly forked*, bearing the crowded *fruit-dots* (*soon confluent*) near their middle. (Polypodium Thelypteris, *L.*) — Marshes; common. Aug. — Stalk 1° long or more, usually longer than the frond, which is of thicker texture than in the next, slightly downy; the fruit-dots soon confluent and covering the whole contracted lower surface of the pinnæ. (Eu.)

2. **A. Noveboracénse,** Willd. Frond pinnate, *oblong-lanceolate in outline, tapering below, from the lower pinnæ* (2–several pairs) *being gradually shorter and deflexed; the lobes flat*, broadly oblong; their *veins all simple* except in the lowest pairs, bearing scattered *fruit-dots* (*never confluent*) near the margin. (Polypodium Noveboracense, *L.* A. thelypteroides, *Swartz.*) — Swamps and moist thickets; common. July. — Frond pale green, delicate and membranaceous, nearly as the last, except in the points mentioned.

* * *Veins, at least the lowermost, more than once forked or somewhat pinnately branching; the fruit-bearing veinlets often obscure or vanishing above the fruit-dot: fronds, at least the sterile ones, often remaining green through the winter: stalks and apex of the scaly thickened rootstocks chaffy, and often the main rhachis also when young.*

+ *Frond twice pinnate and with the pinnules pinnatifid or deeply incised: indusium deciduous.*

3. **A. spinulòsum,** Swartz. Frond oblong or ovate-oblong in outline (1°–2° long), lively green, smooth; pinnules oblong or oblong-linear, mostly obtuse, horizontal, crowded, the lower deeply pinnatifid into linear-oblong obtuse lobes which are sharply cut-toothed, the upper cut-pinnatifid or incised, with the shorter lobes few-toothed at the apex; margin of the indusium denticulate or beset with minute stalked glands. (A. intermedium, *Muhl.* Dryopteris intermedia, *ed.* 1.) — Woods, everywhere common. July. — Exhibits a variety of forms, some of them clearly the same as the European plant, more commonly intermediate in appearance between it and

Var. **dilatàtum.** Frond broader, ovate or triangular-ovate in outline; pinnules lance-oblong, the lower sometimes pinnately divided; indusium smooth and naked. (A. dilatatum, *Willd.*) — A dwarf state, fruiting when only 5′–8 high, answers to var. (of Lastræa dilatata) dumetorum. A peculiar form (A. campylopterum, *Kunze?* and Dryopteris dilatata, chiefly, *ed.* 1) has the pinnæ, pinnules, and their divisions remarkably crowded, and directed obliquely forwards or rather scythe-shaped. — N. New England to Wisconsin, chiefly in mountain woods, and northward. (Eu.)

Var. **Boottii.** Frond elongated-oblong or elongated-lanceolate in outline; pinnules broadly oblong, very obtuse, the lower pinnatifid, the upper and smaller merely serrate; indusium minutely glandular. (A. Boottii, *Tuckerm.* Dryopteris rigida, *ed.* 1; not Aspidium rigidum, *Swartz.*) — E. Massachusetts, *Boott*, &c. Connecticut, *D. C. Eaton*, and northward. — The least dissected form, intermediate in appearance between A. spinulosum and A. cristatum, but passing into the former.

+ + *Frond once pinnate, and the pinnæ deeply pinnatifid, or at the base nearly twice pinnate: fruit-dots within the margin, large; the indusium thinnish and flat.*

4. **A. cristàtum,** Swartz. *Frond linear-oblong or lanceolate* in outline (1½° to 2½° long and very long-stalked); *pinnæ short* (2′ – 3′), triangular-oblong, or the lowest nearly triangular-ovate, from a somewhat heart-shaped base, acute, deeply pinnatifid; the *divisions* (8 – 13 *pairs*) *oblong*, very obtuse, finely serrate or cut-toothed, the lowest pinnatifid-lobed; *fruit-dots as near the midrib as the margin, often confluent.* (A. Lancastriense, *Swartz.*) — Swamps, &c.; common. July. — Stalk bearing broad and deciduous chaffy scales. (Eu.)

5. **A. Goldiànum,** Hook. *Frond broadly ovate,* or the fertile ovate-oblong in outline (2° – 3° long), short-stalked; pinnæ (6′ – 9′ long) oblong-lanceolate, pinnately parted; the *divisions* (*about* 20 *pairs*) *oblong-linear,* slightly scythe-shaped, obtuse (1′ long), serrate with appressed teeth, bearing the distinct *fruit-dots nearer the midrib than the margin* (these smaller than in No. 4). — Rich and moist woods, from Connecticut to Kentucky, and northward. Sept. — A stately species, often 4° high; the fronds decaying in autumn. Indusium often orbicular without a distinct sinus, as in Polystichum.

+ + + *Fronds* (*thickish and mostly persistent through the winter, as in* Polystichum), *twice pinnate, but the nearly entire upper pinnules confluent, some of the lower pinnatifid-toothed: fruit-dots close to the margin; the indusium thickish and tumid.*

6. **A. marginàle,** Swartz. Frond ovate-oblong in outline (1° – 2° long), pale green; pinnæ lanceolate from a broad almost sessile base; pinnules oblong, obtuse, crowded. — Rocky hill-sides in rich woods; common, especially northward. July.

§ 2. POLÝSTICHUM, Roth. — *Indusium orbicular and entire, peltate,* (*or rarely round-kidney-shaped in the same species, as in No.* 7,) *fixed by the depressed centre: fronds rigid and coriaceous, evergreen, very chaffy on the rhachis, &c.; the pinnæ or pinnules auricled at the base on the upper side, crowded, the teeth or lobes bristle-tipped.*

* *Fronds twice pinnate or nearly so.*

7. **A. fràgrans,** Swartz. *Fronds* (4′ – 9′ high) *glandular* and aromatic, *pinnate,* with the linear-oblong pinnæ pinnately parted; their crowded divisions (2″ long) oblong, obtuse, covered with the fruit-dots, the rusty-brown great indusia nearly equalling them in breadth; rhachis, &c. chaffy with very large scales. — Shaded trap-rocks, Falls of the St. Croix, Wisconsin, *Dr. Parry,* and high northward.

8. **A. aculeàtum,** Swartz, var. **Braunii,** Koch. *Frond spreading, 2-pinnate* (1½° – 2° long), oblong-lanceolate in outline, with a tapering base, the lower of the many pairs of oblong-lanceolate pinnæ gradually reduced in size and obtuse; pinnules ovate or oblong, obtuse, truncate and almost rectangular at the base, short-stalked, or the upper confluent, sharply toothed, beset with long and soft as well as chaffy hairs. (A. Braunii, *Spenner.*) — Deep woods, mountains of New Hampshire, Vermont, N. New York, and northward. (Eu.)

* * *Fronds simply pinnate, mostly upright.*

9. **A. acrostichoides,** Swartz. Frond lanceolate (1° – 2½° high), *stalked; pinnæ linear-lanceolate,* somewhat scythe-shaped, half-halberd-shaped at the slightly stalked base, serrulate with appressed bristly teeth; *the fertile* (upper) ones *contracted and smaller,* bearing contiguous fruit-dots near the midrib, which are confluent with age, and cover the surface. (Nephrodium acrostichoides, *Michx.*) — Var. INCÌSUM (A. Schweinitzii, *Beck*) is a state with cut-lobed pinnæ, a not unfrequent case in the sterile fronds; sometimes the tips of almost all of them fertile more or less. — Hill-sides and ravines in woods; common northward, and southward along the Alleghanies. July.

10. **A. Lonchìtis,** Swartz? Frond linear-lanceolate (9′ – 20′ high), *scarcely stalked, very rigid; pinnæ broadly lanceolate-scythe-shaped, or the lowest triangular,* strongly auricled on the upper side and wedge-truncate on the lower, densely spiny-toothed (1′ or less in length), copiously fruit-bearing; fruit-dots contiguous and near the margins. — Woods, southern shore of Lake Superior, and northwestward. (Eu.)

15. ONOCLÈA, L. SENSITIVE FERN. (Tab. 12.)

Fertile frond twice pinnate, much contracted; the pinnules short and revolute, usually so rolled up as to be converted into berry-shaped closed involucres filled with sporangia, and forming a one-sided spike or raceme. Fruit-dots one on the middle of each strong and simple primary vein (with or without sterile cross-veins), round, soon all confluent. Indusium very thin, hood-like, lateral, fixed by its lower side, free on the upper (towards the apex of the pinnule). — Sterile fronds rising separately from the naked extensively creeping rootstock, long-stalked, broadly triangular in outline, deeply pinnatifid into lance-oblong pinnæ, which are entire or wavy-toothed, or the lowest pair sinuate-pinnatifid (decaying in autumn); veins reticulated with fine meshes. (Name apparently from ὄνος, *a vessel,* and κλείω, *to close,* from the singularly rolled up fructification.)

1. **O. sensìbilis,** L. — Moist or wet places, along streams; common. July. — A rare abnormal state, in which the pinnæ of some of the sterile fronds, becoming again pinnatifid and more or less contracted, bear some fruit-dots without being much revolute or losing their foliaceous character, is the var. OBTUSILOBÀTA, *Torr. N. Y. State Fl.* (Yates County, New York, *Sartwell,* and Washington County, *Dr. Smith.* New Haven, Connecticut, *D. C. Eaton.*) This explains the long-lost O. obtusilobàta, *Schkuhr* (from Pennsylvania), which, as figured, has the sterile fronds thus 2-pinnately divided. (Ragiopteris, *Presl.* is founded on a young fertile frond of this species and the sterile frond of some different Fern.)

SUBORDER II. OSMUNDÍNEÆ. FLOWERING-FERN FAMILY.

16. SCHIZÆA, Smith. SCHIZÆA. (Tab. 13.)

Fertile fronds of several contracted linear pinnæ, which are approximated in pairs at the apex of a slender stalk; the under (inner) side covered with the fructification, consisting of two rows of sessile naked sporangia, which are oval, vertical, furnished with a striate-rayed crest at the apex, and opening by a longitudinal cleft down the outer side. Sterile fronds linear or thread-like, sometimes forked and cleft (whence the name, from σχίζω, *to slit*).

1. **S. pusilla,** Pursh. Sterile fronds linear-thread-form, simple, tortuous, much shorter than the fertile, which bears about 5 pairs of short crowded pinnæ at the apex of a slender stalk (3′ – 4′ high). — Low grounds, pine barrens of New Jersey; rare.

17. LYGÒDIUM, Swartz. CLIMBING FERN. (Tab. 13.)

Fronds twining or climbing, bearing stalked and variously lobed divisions in pairs, with free veins; the fructification on separate contracted divisions or spike-like lobes, one side of which is covered with hooded scales for indusia, imbricated in two ranks, fixed by a broad base, each enclosing a single sporangium, or rarely a pair. Sporangia much as in Schizæa, but oblique, fixed to the vein by the inner side next the base. (Name from λυγώδης, *flexile.*)

1. **L. palmàtum,** Swartz. Very smooth; stalks slender, flexile and twining (1° – 3° long), from slender running rootstocks; the short alternate branches or petioles deeply 2-forked, each fork bearing a rounded heart-shaped palmately 4 – 7-lobed sterile frondlet; fertile frondlets above, contracted and several times forked, forming a terminal panicle. (Hydroglossum, *Willd.*) — Shaded or moist grassy places, Massachusetts to Virginia, Kentucky, and sparingly southward; rare. July.

18. OSMÚNDA, L. FLOWERING FERN. (Tab. 13.)

Sporangia globular, short-pedicelled, naked, entirely covering the fertile fronds or certain pinnæ (which are contracted to the mere rhachis), thin and reticulated, not striate-rayed at the apex, opening opposite the pedicel into two valves. Spores green. — Fronds tall and upright, from thickened rootstocks, 1 – 2-pinnate; veins forking and free. (*Osmunder*, a Saxon name of the Celtic divinity Thor.)

* *Fronds twice pinnate, fertile at the top.*

1. **O. regàlis,** L. (FLOWERING FERN.) Very smooth, pale green (2° – 5° high); sterile pinnules 13 – 25, lance-oblong, more or less serrulate, otherwise mostly entire, oblique (or often auricled on the lower side) at the nearly sessile base (1 – 2′ long); the fertile racemose-panicled at the summit of the frond. (Eu.)

Var. **spectábilis.** Pinnules ordinarily narrower and less auricled, or obliquely truncate at the *slightly stalked base.* (O. spectabilis, *Willd.*) — Swamps and wet woods; common. June, July.

* * *Sterile fronds once pinnate; the pinnæ deeply pinnatifid; the lobes entire.*

2. **O. Claytoniàna,** L. Clothed with loose wool when unfolding, soon perfectly smooth (2° - 3° high); *pinnæ oblong-lanceolate,* with oblong obtuse divisions; *some* (2 - 5 pairs) *of the middle pinnæ fertile,* these entirely pinnate; sporangia greenish turning brown. (O. interrupta, *Michx., &c.*) — Low grounds; common. May: fruiting as it unfolds. — This, being Clayton's plant (as I ascertained in 1839, both from the Claytonian and Linnæan herbaria), must bear the original Linnæan name, though wrongly described, from young specimens in which the fructification was thought to be terminal.

3. **O. cinnamòmea,** L. (CINNAMON-FERN.) Clothed with rusty wool when young; sterile fronds smooth when full grown, the lanceolate pinnæ pinnatifid into broadly oblong obtuse divisions; *fertile fronds separate,* from the same rootstock, contracted, 2-pinnate, covered with the cinnamon-colored sporangia. — Var. FRONDÒSA is a rare occasional state, in which some of the fronds are sterile below and more sparsely fertile at their summit. (O. Claytoniana, *Conrad,* not of *L.*) — Rarely such fronds are fertile in the middle, otherwise sterile. — Swamps and low copses; everywhere. May. — Growing in large bunches; the fertile fronds in the centre, perfecting fruit as they unfold, 1° - 2° long, decaying long before the sterile fronds (at length 4° - 5° high) get their growth.

SUBORDER III. OPHIOGLÓSSEÆ. THE ADDER-TONGUE FAM.

19. BOTRÝCHIUM, Swartz. MOONWORT. (Tab. 13.)

Frond ternately or pinnately divided or compound, rising straight from the roots (of strong clustered and thickened fibres); the lateral division sterile, with forking free veins, the terminal one wholly fertile: spike contracted, the spikes pinnately panicled. Sporangia sessile, clustered but distinct, rather coriaceous, veinless, transversely 2-valved, shedding the copious powdery sulphur-colored spores. (Name a diminutive of βότρυς, *a cluster of grapes,* from the appearance of the fruitful fronds.)

1. **B. lunarioìdes,** Swartz. *Sterile frond petioled, from near the base,* 2 - 3-ternate, or the ultimate divisions often pinnate or pinnately parted, broadly triangular in general outline; the lobes or divisions obovate, somewhat kidney-shaped, roundish, or oblong, somewhat crenate; fertile stalk 3′ - 6′ high; fructification mostly 2-pinnate. (Bótrypus lunarioides, *Michx.* Botrychium fumarioides & matricarioides, *Willd.*) — Dry, rich woods, mostly southward. July. — A state, from Hingham, Mass. (*C. J. Sprague*), has the two lateral primary divisions of the sterile frond changed into long-stalked fertile fronds. (Eu.)

Var. **obliquum** (B. obliquum, *Muhl.*) is mostly larger (6′ - 17′ high); the fertile frond more compound; the sterile with oblong or lanceolate divisions, either obtuse or oblique at the base, nearly entire, toothed, or irregularly pinnatifid. — New England to Wisconsin, and southward; rather scarce.

Var. **disséctum** (B. dissectum, *Muhl.*). Divisions of the sterile frond compoundly and laciniately cut into narrow small lobes and teeth: otherwise as the last, into which it passes, and with which it grows.

2. **B. Virginicum,** Swartz. *Sterile frond sessile above the middle of the stalk of the fertile one, ternate;* the short-stalked primary divisions once or twice pinnate, and then once or twice pinnatifid, thin, the lobes cut-toothed towards the apex, oblong; fructification mostly 2-pinnate: plant 1°–2° high, or often reduced to 5′–10′, when it is B. gracile, *Pursh.* — Rich woods; common. July, Aug. (Eu.)

Var.? **simplex** (B. simplex, *Hitchcock*) appears to be a remarkably depauperate state of this, only 2′–5′ high; the sterile frond reduced to a single short-stalked division, and simply or doubly pinnatifid, the lobes obovate or oblong, thinner, and the veins more perceptible than in the European B. Lunaria. — W. New England, New York, and northward.

20. OPHIOGLÓSSUM, L. Adder's-Tongue. (Tab. 13.)

Frond a naked stalk rising straight, bearing a lateral sterile portion resembling in form an entire leaf with finely reticulated immersed veins, and a simple terminal spike, on the edges of which the opaque and coriaceous sessile veinless sporangia are closely packed, in 2 ranks, all more or less coherent together, so as to appear necklace-jointed, transversely 2-valved. Spores copious, sulphur-color. (Name compounded of ὄφις, *a serpent,* and γλῶσσα, *tongue.*)

1. **O. vulgàtum,** L. Sterile frond (in the N. American form) obovate or ovate with a tapering sessile base (1′–3′ long), and mostly borne below the middle of the stalk of the fertile spike. — Bogs and meadows: not common. June. (Eu.)

ORDER 137. LYCOPODIÀCEÆ. (CLUB-MOSS FAMILY.)

Low plants, usually of Moss-like aspect, with their solid and often woody stems thickly clothed with sessile awl-shaped or lanceolate persistent and simple leaves, bearing the 2–4-valved spore-cases sessile in their axils; represented by only two genera.

1. LYCOPÒDIUM, L., Spring. Club-Moss. (Tab. 14.)

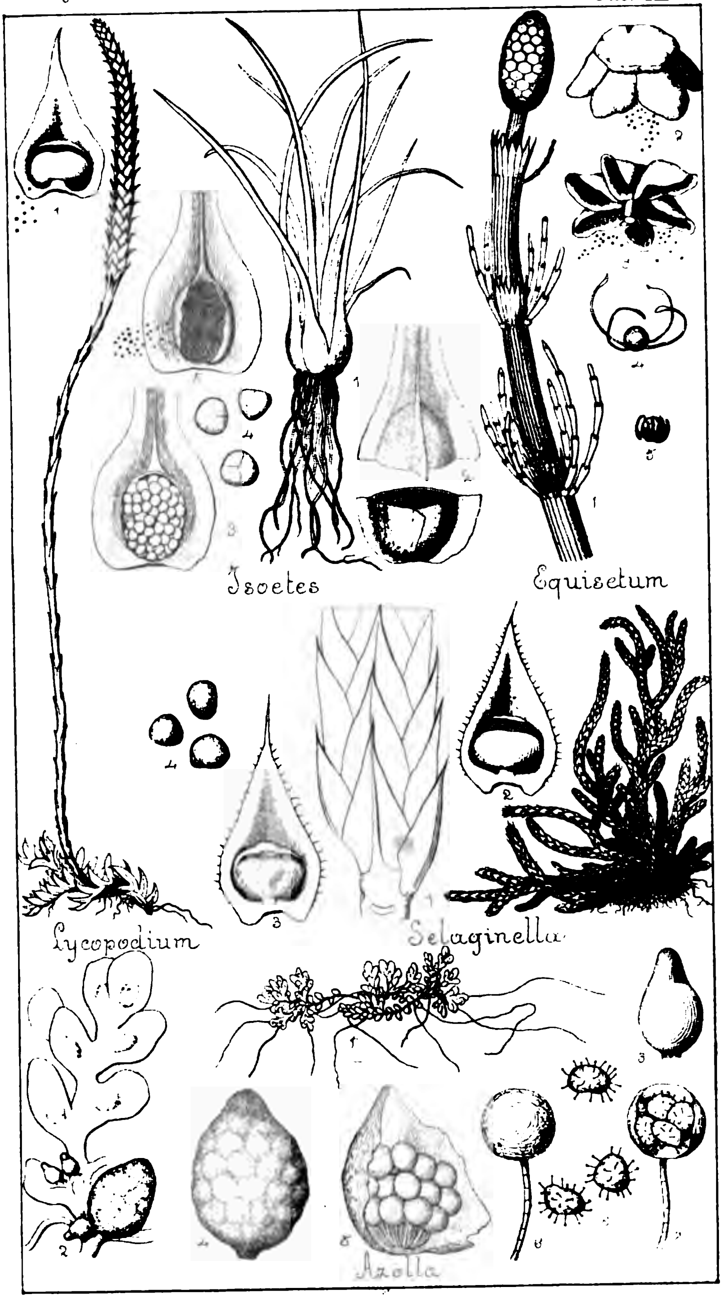
Spore-cases of one kind (*sporangia,* much like those of Ophioglossum, only larger), coriaceous, flattened, usually kidney-shaped, 1-celled, opening by a transverse line round the margin, thus 2-valved, discharging the subtile spores in the form of a copious sulphur-colored inflammable powder. — Perennials, with evergreen 1-nerved leaves, imbricated or crowded in 4–16 ranks. (Name compounded of λύκος, *a wolf,* and πούς, *foot,* from no obvious resemblance.)

§ 1. *Sporangia scattered in the axils of the ordinary and uniform (dark-green and shining, rigid, about 8-ranked) leaves.*

1. **L. lucídulum,** Michx. Stems thick, 2 or 3 times forked, the branches ascending (6′–12′ high); *leaves widely spreading or reflexed,* linear-lanceolate, acute, *minutely toothed.* — Cold, damp woods; common northward, and southward along the higher Alleghanies. August.

Genera of Lycopodiaceæ, Equisetaceæ, &c.

Tab. XIV



2. **L. Selàgo,** L. Stems thick and rigid, erect, fork-branched, forming a level-topped cluster (3′–6′ high); *leaves spreading,* lanceolate, pointed, *entire.* — Tops of high mountains, Maine to New York, on the Alleghanies southward; also shore of Lake Superior, and northward; rare: both the variety with more erect, and that with widely spreading, leaves. (Eu.)

§ 2. *Sporangia borne only in the axils of the upper (bracteal) leaves, thus forming terminal spikes or catkins.*

* *Leaves of the creeping sterile and the upright fertile stems or branches, and those of the simple spike all alike, many-ranked (sporangia opening near the base).*

3. **L. inundàtum,** L. *Dwarf;* creeping sterile stems forking, flaccid; the fertile solitary (1′–4′ high), bearing a short thick spike; *leaves lanceolate or lance-awl-shaped, acute,* soft, spreading, *naked,* or sometimes bearing a few minute spiny teeth. — Leaves (curving upwards on the prostrate shoots) narrower in the American than in the European plant (perhaps a distinct species), and passing into the var. Bigelòvii, Tuckerm.: with fertile stems 5′–7′ high, its leaves more awl-shaped and pointed, sparser and more upright, often somewhat teeth-bearing. (L. Carolinianum, *Bigel.,* not of *L.*) — Sandy bogs, northward, rare: the var. from New England to New Jersey and southward, near the coast. Aug. (Eu.)

4. **L. alopecuroìdes,** L. *Stems stout,* very densely leafy throughout; the sterile branches recurved-procumbent and creeping; the fertile of the same thickness, 6′–20′ high; *leaves narrowly linear-awl-shaped, spinulose-pointed, spreading, conspicuously bristle-toothed below the middle; those of the cylindrical spike with long setaceous tips.* — Pine-barren swamps, New Jersey to Virginia, and southward. Aug., Sept. — Stems, with the dense leaves, ½′ thick; the comose spike, with its longer spreading leaves, ¾′ to 1′ thick.

* * *Leaves (bracts) of the catkin-like spike scale-like, imbricated, yellowish, ovate or heart-shaped, very different from those of the sterile stems and branches.*

+ *Spikes sessile (branches equally leafy to the top), single.*

5. **L. annótinum,** L. Much branched; *stems prostrate and creeping* (1°–4° long); *the ascending branches similar* (5′–8′ high), sparingly forked, the sterile ones making yearly growths from the summit; *leaves equal, spreading,* in about 5 ranks, rigid, lanceolate, pointed, minutely serrulate (pale green); spike solitary, oblong-cylindrical, thick. — Var. púngens, Spring, is a reduced sub-alpine or mountain form, with shorter and more rigid-pointed erectish leaves. (Var. montanum, *Tuckerm.*) — Woods; common northward: the var. on the White Mountains, with intermediate forms around the base. July. (Eu.)

6. **L. dendroídeum,** Michx. (Ground-Pine.) *Stems upright* (6′–9′ high) from a subterranean creeping rootstock, *simple below,* and clothed with homogeneous lanceolate-linear acute entire leaves appressed-erect in 4–6 rows, *bushy-branched at the summit; the crowded branches spreading, fan-like,* with the lower row of leaves shorter and the lateral spreading, — in var. obscùrum appearing flat, from the leaves of the upper side being also shorter and appressed. (L. obscurum, *L.*) — Moist woods. Aug. — Remarkable for its tree-like growth. Spikes cylindrical, 4–10 on each plant.

← ← *Spikes peduncled: viz. the leaves minute on the fertile branches.*

↔ *Leaves homogeneous and equal, many-ranked: stems terete.*

7. **L. clavàtum,** L. (COMMON CLUB-MOSS.) Stems creeping extensively, with similar ascending short and very leafy branches; the fertile terminated by a slender peduncle (4′–6′ long), bearing about 2–3 (rarely 1 or 4) linear-cylindrical spikes; leaves linear-awl-shaped, incurved-spreading (light green), tipped, as also the bracts, with a fine bristle. — Dry woods; common northward. July. (Eu.)

↔ ↔ *Leaves of two forms, few-ranked: stems or branches flattened.*

8. **L. Caroliniànum,** L. Sterile stems and their few short branches *entirely creeping* (leafless and rooting on the under side), thickly clothed with broadly lanceolate acute and somewhat oblique 1-nerved *lateral leaves widely spreading in 2 ranks*, and a shorter intermediate row appressed on the upper side; also sending up a slender simple peduncle (2′–4′ high, clothed merely with small bract-like and appressed awl-shaped leaves), *bearing a single* cylindrical *spike.* — Wet pine barrens, New Jersey to Virginia, and southward. July.

9. **L. complanàtum,** L. Stems extensively creeping (often subterranean), the erect or *ascending branches several times forked above;* bushy *branchlets* crowded, *flattened, all clothed with minute imbricated-appressed awl-shaped leaves in 4 ranks*, with decurrent-united bases, the lateral rows with somewhat spreading tooth-like tips, those of the upper and under rows smaller, narrower, wholly appressed; peduncle slender, bearing 2–4 cylindrical spikes. — Woods and thickets; common: the typical form with *spreading fan-like branches* abundant southward; while northward, especially far northward, it passes gradually into var. SABINÆFÒLIUM (L. sabinæfolium, *Willd.*, L. Chamæcyparissus, *Braun*), with more erect and fascicled branches. (Eu.)

2. SELAGINÉLLA, Beauv., Spring. (Tab. 14.)

Fructification of two kinds, namely, of spore-cases like those of Lycopodium, but very minute and oblong or globular, containing reddish or orange-colored powdery spores; and of 3–4-valved tumid *oophoridia*, filled by 3 or 4 (rarely 1–6) much larger globose-angular spores; the latter either intermixed with the former in the same axils, or solitary (and larger) in the lower axils of the leafy 4-ranked sessile spike. (Name a diminutive of *Selago*, an ancient name of a Lycopodium, from which this genus is separated.)

* *Leaves all alike, equally imbricated; those of the spike similar.*

1. **S. selaginoìdes.** *Sterile stems prostrate* or creeping, small and slender; *the fertile thicker, ascending, simple* (1′–3′ high); *leaves lanceolate, acute, spreading, sparsely spinulose-ciliate.* (S. spinosa, *Beauv.* S. spinulosa, *Braun.*) — Wet places, New Hampshire (*Pursh*) and Michigan, Lake Superior and northward; pretty rare. — Leaves larger on the fertile stems, thin, yellowish-green. (Eu.)

2. **S. rupéstris,** Spring. *Much branched in close tufts* (1′–3′ high); *leaves densely appressed-imbricated, linear-lanceolate,* convex and with a grooved keel, *minutely ciliate, bristle-tipped;* those of the strongly 4-angular spike rather broad-

er; the two sorts of fructification in the same axils. (Lycopodium rupestre, *L.*) — Dry and exposed rocks; common. — Grayish-green in aspect, resembling a rigid Moss.

* * *Leaves of 2 sorts, the shorter above and below, resembling stipules, the larger lateral, 2-ranked.*

3. **S. àpus,** Spring. Stems tufted and prostrate, creeping, much branched, flaccid; leaves pellucid-membranaceous, the larger spreading horizontally, ovate, oblique, mostly obtuse; the others smaller, appressed, taper-pointed; those of the short spikes nearly similar; oophoridia copious at the lower part of the spike. (Lycopodium ápodum, *L.*) — Low, shady places, S. New England, near the coast, to Virginia, and southward. — A delicate little plant, resembling a Moss or Jungermannia.

ORDER 138. HYDROPTÉRIDES. (MARSILEACEÆ, R. Br.)

Aquatic cryptogamous plants, of diverse habit, with the fructification borne at the bases of the leaves, or on submerged branches, consisting of two sorts of organs, contained in indehiscent or irregularly bursting involucres (sporocarps): — here represented by only two genera; one of them, Isoetes, nearly related to Club-Mosses in structure; the other, Azolla, much like a floating Liverwort.

I. ISÒETES, L. QUILLWORT. (Tab. 14.)

Stem a mere succulent base or crown, rooting from underneath, and covered above with the dilated imbricated bases of the elongated terete awl-shaped or stalk-like cellular leaves. Sporocarps ovoid and plano-convex, pretty large; sessile in the axils of the leaves and united with or enveloped by their excavated dilated base, very thin, traversed internally by transverse threads, forming a kind of partitions; those of the central leaves filled with very minute powdery grains (analogous to the spores of Lycopodium); the exterior filled with larger spherical-quadrangular spores (*oophoridia*), at first cohering in fours, their crustaceous integument marked by 3 radiant lines. (Name composed of *ἴσος*, *equal*, and *ἔτος*, *year;* perhaps intended to indicate that these aquatic plants are unchanged by the season, i. e. alike the year through.)

1. **I. lacústris,** L. Crown or rootstock broad and depressed; leaves wholly submersed, dark green, rigid and fragile, awl-shaped (2′ – 6′ long), the dilated base as broad as long; spores (oophoridia) roughish-granulated, scarcely reticulated. — Bottom of ponds and slow streams; not rare northward. — New England specimens agree well with the European plant, and also seem too nearly like the next. The following species are admitted in deference to authority: but probably all are forms of one. (Eu.)

2. **I. ripària,** Engelm. Crown small; leaves slender, soft, yellowish-green (4′ – 6′ long), the base broader than long; spores minutely farinaceous and reticulated. — Gravelly banks of the Delaware below Philadelphia, between

high and low water mark, *Dr. Zantzinger:* and probably throughout the Middle States.

3. **I. Engelmánni,** Braun. Leaves long and slender (9′–12′ long), entirely emersed in summer, soft and flaccid, light yellowish-green, the dilated base longer than broad; spores coarsely farinaceous and reticulated.—Shallow ponds of the Western States, and southward.

2. AZÓLLA, Lam. AZOLLA. (Tab. 14.)

Plant floating free, pinnately branched, clothed with minute imbricated leaves, appearing like a small Jungermannia: fructification sessile on the under side of the branches, of 2 sorts. Sporocarps covered at first with an indusium of a single diaphanous membrane, ovoid; the smaller kind opening transversely all round, containing several roundish-angular *antheridia?* peltately borne on the sides of a central erect column: the large or fertile kind bursting irregularly, filled with numerous spherical sporangia rising from the base on slender stalks, each containing a few globular spores. (Name said to come from ἄζω, *to dry*, and ὄλλω, *to kill*, being destroyed by dryness.)

1. **A. Caroliniàna,** Willd. Leaves ovate-oblong, obtuse, spreading, reddish underneath, beset with a few bristles.—Pools and lakes, New York to Illinois, and southward.—Plant ½′ to 1′ broad.—Probably the same as A. Magellanica of all South America.

MARSÍLEA MUCRONÀTA and perhaps M. VESTÌTA may occur in the western parts of Illinois and Wisconsin.

SALVÍNIA NÀTANS, L., said by Pursh to grow floating on the surface of small lakes in W. New York, has not been found by any other person, and probably does not occur in this country. It is therefore omitted.

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*** The names of the Classes, Subclasses, and the Latin names of Orders, are in full capitals; of the Suborders, Tribes, &c., in small capitals; of the Genera, &c., as well as popular names and synonymes, in common type.

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EXPLANATION OF THE PLATES.

Genera of Filices.

Tab. IX.

POLYPODIUM.—Plant; piece of the frond (1); a magnified sporangium with its stalk, and another bursting and discharging spores, of P. vulgare, L.

STRUTHIOPTERIS.—Pinna of the sterile frond (1) of S. Germanica, *Willd.*; portion of a fertile frond (2); a piece of one pinna cut off to show the manner in which it is rolled up (3); and a portion of the last, magnified, with one side unrolled (4); towards the base the sporangia all removed, to show how the fruit-dots are borne each on the middle of a vein.

ALLOSORUS.—Sterile and fertile plants of A. gracilis, *Presl*; and a portion of the fertile frond (1) enlarged, with a piece of the marginal indusium turned back to display the fruit; the sporangia are all removed from the fruit-bearing tips of the two forks of the lower vein.

Tab. X.

PTERIS.—A pinnule of P. aquilina, *L.*, var. caudata; and a piece of one of the lobes, enlarged (2), the marginal indusium rolled back on one side, displaying the fruit; the sporangia all removed from the lower part to show the receptacle that bears them, viz. a cross line connecting the tips of the veins.

ADIANTUM.—Piece of the frond of A. pedatum. *L.* (1); a pinnule somewhat enlarged (2); and a piece of one (3) more enlarged, with the indusium of one fruit-dot turned back to show the attachment of the fruit.

CHEILANTHES.—Small plant of C. vestita (1); and a fruit-bearing pinnule, enlarged (2)

WOODWARDIA.—Portion of the sterile (1) and of the fertile frond (2) of W. angustifolia; a piece of the latter enlarged (3); piece of the frond of W. Virginica (4); and part of a fruiting lobe (5), enlarged.

Tab. XI.

CAMPTOSORUS.—Plant of C. rhizophyllus, *Link.*; and a portion of a frond, with fruit-dots, enlarged (1).

SCOLOPENDRIUM.—Tip of a fertile frond of S. officinarum; and (2) a piece enlarged, with two fruit-dots.

ASPLENIUM.—A pinna of A. thelypteroides, *Michx.* (1); and part of a lobe (2) in fruit, enlarged.

DICKSONIA, § SITOLOBIUM.—Pinna of D. punctilobula, *Hook.* (1); portion of a pinnule (2), enlarged; and a fruit-dot in its cup-shaped indusium (3).

Tab. XII.

CYSTOPTERIS.—Piece of the frond of C. bulbifera, *Bernh.* (1); a lobe in fruit (2), enlarged; and a small portion more magnified (3), bearing a fruit-dot with its indusium thrown back.

WOODSIA.—Small frond of W. glabella, *R. Br.* (1); a part of a fruiting pinna of the same (2), magnified; and a separate indusium (3), more magnified; a piece of a fruitful pinnule of W. obtusa, *Torr.* (4), enlarged; and a fruit with the opened indusium beneath (5), more magnified.

ASPIDIUM.—Pinna of A. (Dryopteris) marginale, *Swartz* (1); and a magnified fruiting portion (2); piece of A. (Polystichum) acrostichoides (3); and a small fruiting portion (4), magnified.

ONOCLEA.—Sterile and fertile frond of O. sensibilis, *L.;* front view of a fruiting contracted pinnule, enlarged (1); and the same laid open and viewed from the other side (2): on one lobe the sporangia are removed from the veins.

Tab. XIII.

SCHIZÆA.—Plant of S. pusilla, *Pursh;* a fertile pinna with eleven sporangia (1), magnified; and a separate sporangium (2), more magnified.

LYGODIUM.—Summit of frond of L. palmatum, *Swartz* (1), with fertile and sterile divisions; a fruiting lobe enlarged (2), with two of the lower scales, or indusia, removed, displaying a sporangium under each; and a sporangium more magnified (3).

OSMUNDA.—Small piece of the frond of O. Claytoniana, *L.* (1), with a fertile and a sterile pinna; a portion of the fruit magnified (2); and one sporangium more magnified (3).

BOTRYCHIUM.—Plant of B. lunarioides, *Swartz;* and a portion of the fruit (1), with six sporangia, magnified.

OPHIOGLOSSUM.—Frond of O. vulgatum, *L.;* and a portion of the fruiting spike enlarged (1).

Genera of Equisetaceæ, Lycopodiaceæ, and Hydropterides.

Tab. XIV.

EQUISETUM.—Upper part of fertile plant of E. limosum, *L.* (1); one of the shield-shaped scales or receptacles of the spike, with the six sporangia underneath (2), enlarged; same seen from below, discharging the spores (3); a magnified spore with the club-shaped filaments spreading (4); and (5) the same with the filaments coiled up.

LYCOPODIUM.—Plant of L. Carolinianum, *L.;* and (1) a magnified scale of the spike removed, with the sporangium in its axil, discharging powdery spores.

SELAGINELLA.—Plant of S. rupestris, *Spring;* part of a fertile spike, enlarged (1); scale from the upper part of it (2), with its sporangium, containing innumerable powdery spores; scale from the base (3), with its sporangium containing few large spores; and (4) three large spores.

EXPLANATION OF THE PLATES.

ISOETES.—Plant of I. lacustris (1); sporocarp containing minute spores, cut across (2), enlarged; same divided lengthwise (5); sporocarp with coarse spores, divided lengthwise (3); and (4) three coarse spores more magnified.

AZOLLA.—Plant (1); a portion magnified (2), with two kinds of organs; sterile sporocarp, or antheridium, more magnified (3); fertile sporocarp more magnified (4); the same burst open, showing the stalked sporangia (5); one of the latter more magnified (6); another bursting (7); and three spores (8), beset with bristles.

THE END.

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